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Shortcomings of Munitions Makers

Why There Have Been Delays in
Production and Losses in Money—Net
Result Satisfactory Notwithstanding

—BY G. F. MATTESON*

A YEAR and a half ago a group of American manufacturers agreed to deliver several million rounds of 3-in. ammunition and several million rifles during the year 1916, and some have failed to supply their quota. Foreign engineers, acting as special commissioners or inspectors, have critically examined the personnel, organization and equipment of some of our largest manufacturers—corporations which were known throughout the world for the quantity and quality of their work. They have noted inability to produce the required munitions, inexperience in interchangeable manufacture, and lack of knowledge of the use of gages and instruments of precision; and on the strength of what they have found in these establishments have made such a general indictment of inefficiency that our future trade relations would be seriously affected if this erroneous judgment were uncorrected.

The effect of some of this criticism in the United States has been to cancel unfilled contracts for munitions, to forestall the placing of new contracts, to close some factories and to move machinery to Canada. Thus the ability and efficiency of our manufacturers, engineers and mechanics have been questioned, and in answer to charges that have been made with little discrimination it is certainly in order to present the facts.

What Export Records Show

A glance at the value of our munitions exports or our trade balance will show the enormous quantities which have been forwarded in the past year and which clearly prove that most of our munitions manufacturers are doing good work at a fair profit. It is an injustice to Americans to charge all with inefficiency because of the acts of the ambitious but inexperienced men who through ignorance of factory management and manufacturing methods have

brought failure to a few, but only a few, companies.

If we condense all our knowledge of the causes of the failures into two words, we have: haste and change. In order to determine whether the haste and change were warranted, it will be necessary to review a little modern history so that we may recall the conditions which obtained at the time of placing the munitions contracts. Business was depressed, factories were idle, material was cheap, labor plentiful and Russia's need of munitions great. Here was an opportunity to improve business, to start our factories, to give employment to labor, and to organize our industries so that they

could be of assistance in the defense of our country when needed. The financier and manufacturer, possibly without their usual caution in investigating the terms of the contract, promptly accepted orders for munitions, of which one result was to be industrial organization for home defense without expense to the nation.

After acceptance, the first order was apportioned among several corporations, each having an organization which was sufficient for its own standard lines of manufacture. American engineers and manufacturers have been content to invent and construct those things that lessen the

labor of others and make this world a good place to dwell in. They neglected the study of instruments of destruction and war, and the present emergency found but few who had any knowledge of munitions. The captains of industry immediately sought among our military officers for experienced men to act as advisers and selected many of our most honorable, efficient and best trained officers from all branches of the military service.

The Error of Modifying Specifications

Some of these officers, who had been out of the military or naval schools but a few years, had but little manufacturing or business experience, and in

TWO words, Mr. Matteson says, express the causes of failure in making munitions:

HASTE AND CHANGE

Haste in pushing for production and Change in securing modifications of original specifications without adequate protection through replacement of specification. Most other causes grew out of these two.

The record of concerns which adhered to the requirements and used their own organizations is altogether satisfactory, and the general final result, all plants considered, is an army of trained men and an equipment for making war material ready for the emergency in the event that the United States is involved in war.

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some cases were placed in positions of great responsibility and authority. Their knowledge of munitions was limited to the American type, differing materially from the Russian type, which had been most minutely specified, and they succeeded in their efforts to have some of the parts modified to the American type.

This change of type was a grave error, for the consent to change automatically annulled the carefully tested original specifications and made no provision for replacement of specifications. In all such cases from that day to this there has been one continual tragedy of change of form, material, clearance or tolerance, requiring an endless change of gages, tools and equipment. The indirect method of purchase which separated the manufacturer and purchaser developed in most annoying delays in obtaining official approval of necessary or desired changes.

Immediately after it became known that large orders of munitions had been placed in this country, there were spectacular changes in the machinery and metal markets. All standard lines of machinery were sold out and orders would be accepted only for long delivery. Prices of metals, acids, etc., were doubled—over night, as it were. The corporations having munitions contracts suddenly found an increased demand for their standard product. This required the use of their regular equipment, which had been idle a few months before; and some, rather than interfere in the least with their regular product, decided to purchase new equipment and construct new buildings for their munitions contracts, thus entailing expense and delay. The emergency was pressing, and engineers were quickly engaged to design and construct buildings for housing the machinery for gigantic undertakings. They were given but meager details and in some cases only general instructions specifying the estimated floor space required.

Haste in Securing Buildings and Equipment

Some of these buildings were designed without reference to the laws regarding the use of explosives or safety of employees, for these receive but scant consideration in military circles. The plans of one engineer showed the general offices on the second floor over a storehouse for hundreds of tons of powder. The directors took serious exception to this, and new buildings for powder storage were constructed at the safe distance from the office buildings which the law required. Many buildings were of the convertible type and were constructed more with reference to their future than present use, which accounts for the frequent sight of heavy machinery swaying on poorly designed floors. These are isolated cases where material was wasted and time lost by not taking sufficient time to collect the information required by the engineer.

Incomplete specifications and poor judgment of purchasing agents in placing orders for machinery and material with irresponsible manufacturers or jobbers were also the cause of much loss of time and money. If the orders were filled at all, it was with very inferior material, the product of some mushroom concern which started over night to reap great profits by building imitations of standard machinery or by refining scrap. In either case, a new order was required to be placed with responsible manufacturers at the rapidly increasing market prices.

These orders for extra equipment of machinery and building material, thrown on an already overburdened market, defeated the purpose of early delivery of munitions which was intended, for it with-

drew men and equipment from the production of other much-needed supplies throughout the country. The buildings were completed in record time, and as fast as the roof of one section was finished, carloads of the much-advertised single-purpose machinery were unloaded and installed. It is sad to relate that but little of this machinery was ever of any practical use. Most of it, however, was rebuilt and refitted and its inevitable journey to the scrap pile somewhat delayed.

What Came from the Rush for Production

Then came the call for men. High wages did not bring a quick response from the better workmen. The records of early mysterious fires and blown-up factories left no incentive for the weak or timid. To control the motley crowds required men of strong arms and unquestioned courage and these qualities were preferred to knowledge of interchangeable manufacture or the use of instruments of precision. In the early days it was not uncommon to see a workman tighten a screw on his machine with a snap gage or to see a foreman checking the setting of a micrometer with a 2-ft. rule. It required time to develop skilled workmen from the material available and frequent changes were necessary in an effort to retain only the best.

As soon as the machinery was installed the young and inexperienced managers started the cry of production. It mattered little whether the material was satisfactory, whether the proper gages were on hand or whether the machinery was in proper conditions to operate; nothing must interfere with production. The advice, experience and pleading of their subordinates amounted to nothing; they must have production. It mattered not if the machine bearings were hot, they must be run till they sizzled. It mattered not if a foreman showed signs of breaking after thirty-six or forty-eight hours of continuous duty; he must produce and produce. It is little wonder that capable engineers and laborers alike, after a few months of this high-speed work, suffered nervous and physical exhaustion. This condition called for new men, who followed along for a little while at the pace required, but eventually lost out, only to be replaced by others. Conservation of machines, material and men was neglected. Wasteful effort was applauded if it produced. Warnings that a day of reckoning must surely come were unheeded. The stockholders and directors must have favorable reports and the factory must produce.

In some factories the day of reckoning approaches; in others it has arrived. Excuses have continually been made for delayed shipments and the waste of material has been covered from the directors and stockholders; but now it is necessary to send replacement orders for hundreds of thousands of dollars' worth of material which has been spoiled in manufacture and rejected. The inevitable result of inefficient management is apparent.

Some of the Causes of Delays

There were some annoying delays in the early days of manufacture due to the willful destruction of machinery or equipment by some misguided employees who thus sought to prevent the delivery of munitions. Some sub-contractors took orders which they never intended to fill; and as there was no penalty in their contract for non-delivery, they suffered no loss.

The munitions contract imposed most exacting conditions of inspection by appointees of the purchasing nation. Among such were included a few eminent engineers who were a great help to the

manufacturer; others, who were medical students, house painters, clerks, stenographers, reporters—men having no previous knowledge of munitions—were appointed as inspectors of most important parts, with power to stop all production for most trivial excuses. Some had relatives whom they desired employed by the same firm at high wages; they soon made it apparent that the line of success lay in the path of least resistance to their desires, and their relatives were employed.

Delays were also caused by the scarcity of small standard tools, such as drills and milling cutters. Few manufacturers had the equipment or trained men necessary to make the accurate gages which were required in such large quantities. The precision required by the purchaser of munitions was so great that standard taps and dies would not produce threads of sufficient accuracy, and special thread milling machines had to be developed and accurate means of thread measurement introduced in many factories where such refinements were heretofore unknown.

Such were the conditions under which some of the munitions contracts were operated, earning small profits if not entailing loss to the stockholders. Other firms adhered closely to the original specifications; did not desire change of design; worked as closely as possible to the dimensions given; guarded against the substitution of "something just as good"; delivered what the purchaser desired and what he was willing to pay for and thereby earned the confidence of the staff of inspectors and had little difficulty in producing work to their satisfaction. These firms supplied gages in sufficient quantity and maintained their accuracy; carefully selected their material; used their regular organization and equipment as far as possible; did not overwork either men or machinery, and quickly corrected errors as soon as detected. They were thus able to make early delivery of accurate work in quantity to suit their contract requirements. This policy is the usual procedure in most American factories, and has proved uniformly successful in the manufacture of their regular product as well as of munitions.

The Net Showing

There is now an army of trained men and sufficient equipment is available to supply our country's need in case of war. A period of business depression has been changed to one of greatest prosperity; employment has been given to all at the highest wages; manufacturer and mechanic have been benefited by the exchange of ideas and by the development of methods of precision due to the munitions contracts, and great wealth has been brought to this country in payment for the vast amounts of munitions exported during the past year. This fact indicates that with but few exceptions our American manufacturers are producing good work and are maintaining the high standard which is universally expected of them.

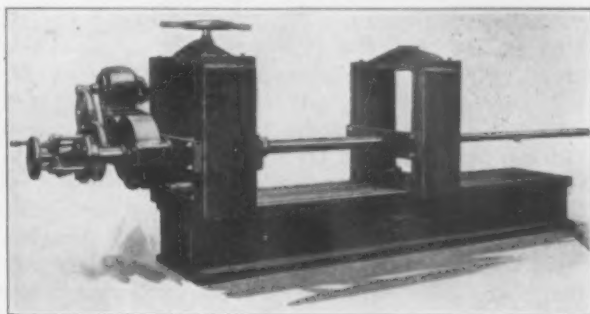
The manufacture of tungsten in the Liverpool district, England, has become important in the last two years. The ore is mined in limited quantities in Cornwall and Cumberland, but it was exported previous to the war. The first steps to make tungsten in England were undertaken by a Liverpool firm which established large works at Garston, Liverpool, and deliveries were begun in the first half of 1915. A second undertaking is that of the co-operation of 31 of the largest steel makers of England, who erected a plant at Widnes, in the same district. Ferrotungsten is now sold at the maximum government price of 5s. 6d. (\$1.34) per lb. The American price is about twice this.

Horizontal Machine for General Boring

Another application of its portable cylinder boring bar has been made by the Pedrick Tool & Machine Company, 3640 North Lawrence Street, Philadelphia, Pa., in a horizontal machine for boring and drilling miscellaneous work. A new design of feed mechanism, automatic in action and reversible, provides three changes, and the speed for boring holes of different diameters is varied by changing the driving gear. Another feature is ability to use the bar either as a traveling or a fixed one, as well as the use of auxiliary bars where the hole to be bored is smaller than the diameter of the main bar.

The machine consists of a bed of heavy construction with a T-slot near each edge of its upper surface. Two housings, which can be moved to suit the work, are fitted to the bed and T-slots on both sides of the housings provide a means for holding bar supports in position at the desired height above the bed. A table equipped with a cross-slide and intended to be placed at right angles to the bed is provided for various classes of work.

A recently developed driving mechanism to which an electric motor can be connected revolves the boring



The Boring Bar in This Horizontal Machine for Miscellaneous Work Can Be Used Either as a Traveling One with a Longer Travel than Usual or as a Fixed One Upon Which the Cutterhead Travels

bar. The main gear of this mechanism is divided, the teeth in one part being opposite the spaces in the other, an arrangement relied on to eliminate backlash. The gearing between the motor and the driving mechanism can be changed and it is possible to connect the former to either the primary or the intermediate shaft. In this way different speeds for boring holes of varying diameters can be obtained. The main bearing for the bar is a long quill with cross-heads at both ends which are bolted to the front housing. The quill is bored to fit the bar and the cross members are faced from the bore, thus giving the proper alignment of the bar irrespective of its location on the housing. The bar is raised or lowered to the desired height by a handwheel operating an elevating screw and provided with a ball thrust bearing.

A new type of feed mechanism is mounted at the end of the bar. This operates at a constant rate, is reversible, provides three changes and is automatic in action. The feed screw is located in a recess on one side of the boring bar, which, it is explained, gives a long, continuous feed. By removing the half feed nut and sliding the bar through the bearing, quick return of the bar is secured. A taper hole in the end of the bar is provided in which auxiliary bars or drills may be fitted when holes smaller than the main bar are to be bored. In this case the main bar travels and feeds the smaller one. In addition to being used as a traveling bar, it is possible to have the boring bar remain fixed in position while the cutterhead travels. The travel of the cutterhead or the bar itself is accomplished by the same mechanism. If the hole to be bored is large enough for the convenient operation of the main boring bar, the work is placed on the bed. The bar with the proper size of cutterhead in place is then pushed through the hole and through the rear bearing on the back housing. In this way the bar is rigidly supported at both ends and the cutterhead travels along the bar, boring the hole to the diameter wanted.

Two Years' Growth of an Abrasive Industry

The Expansion of Grinding Wheel Plants
to Keep Pace with Rising Demands
—The Norton Company as an Example

BY W. E. FREELAND

THE greatly increased use of steel and iron in the two years just past has had marked effects upon industries closely related to metal working. One of the most notable examples is found in the grinding wheel industry, particularly in those plants which use artificial abrasives and so are not hampered by the effects of the war upon the production and importation of natural abrasives.

Unless one has been in close contact with the developments in grinding machinery and grinding wheels, he has had little to call his attention to the rapid strides made by the grinding wheel industry which was literally but an infant in the opening years of this century. In the twenty years that have passed since the introduction of artificial abrasives, grinding has passed from the stage where it was only a finishing operation to its present stage, where it has become a major manufacturing process. During this period of transition it has drafted some of the best engineering talent of the country into its service: some to design better grinding machines; some to develop better artificial abrasives; some to improve processes in grinding wheel manufacture; and others to discover new applications of this method of machining with its possibilities of rapid production and marvelous accuracy.

It is notable that the development of steel alloys has practically kept pace with the progress of grinding wheel and grinding machine manufacture. One has but to step into any large plant turning out products made of manganese steel to see what grinding means in this field. Here on planers, lathes and many other machine tools the cutting tools have been removed and in place of them are motor-driven grinding wheels. The successful machining of this tenacious metal is one of the more recent achievements of grinding. The hardened surfaces of modern steel-alloy machine parts that resist the cutting action of a single large tool yield readily to the millions of cutting teeth that form the surface of an abrasive wheel. As the technique of the alloy makers has increased, the technique of grinding has matched it—and won. So, too, on softer materials grinding has been finding an ever-widening field of usefulness.

Probably no class of grinding problems has larger interest for the manufacturer of machinery and tools who has caught a vision of its future than the use of formed wheels on the various types of precision grinding machines. The use of formed wheels solved one of the greatest problems that arose in the early days of the manufacture of shrapnel and high-explosive shells in this country two years ago. With a wheel shaped by a radial truing device to the precise form required, the grinding of the nose of such shells proved the practical way to get a large production and accurate shape. Many a set of gears is now running quietly and smoothly in our factories because the contours of the teeth have received their final form by the use of a wheel shaped to the precise contour desired.

When the splined transmission shaft was introduced into the automobile, the shaping of the spline brought forth a new type of milling machine. But

in the hardening of the shaft to protect it against the wearing action of the sliding gears, more or less distortion took place. To solve the problem of obtaining a perfect and smooth spline a special machine was designed which uses a formed wheel that grinds upon three of its faces at each single pass of the wheel through the spline. In the olden days a pulley was crowned by turning its face to the shape of an inverted V. In modern practice the face of the pulley is ground by a formed grinding wheel to produce a continuous convex surface. Every engineer will quickly grasp what this means in gain in power transmitted and in life of belting.

What is true in this expanding field of grinding practice is true in all the others. When the electrical industry needed to cut off tungsten wire without distorting the ends by shearing and with the least possible loss of the valuable metal, the technical experts in the manufacture of grinding wheels brought out a special wheel 4 in. in diameter and only 0.015 in. thick—so thin it is translucent and almost transparent—that does the work excellently.

The sandstones of huge bulk and varying texture that have so long been a feature of saw and axe manufacturing are rapidly being replaced by smaller artificial abrasive wheels. This change has been brought about largely by the ability of the grinding wheel makers to produce wheels to meet the precise conditions of the operations. The surfacing of saws, the grinding of axes and the shaping of claw-hammers are good examples of the triumph of scientifically controlled artificial products over Mother Nature.

One of the latest products that bears tribute to the achievements of grinding engineers is the aluminum piston that is beginning to be found in the better grades of automobile engines. Here it required a study of both the wheel and the lubricant to bring success. For, as those who have tried it will testify, there are few materials more difficult to grind than aluminum. In the preceding instances there have been set forth the beginnings in the field of grinding; the end is not in sight, for every day brings forth new problems, and a large group of men is now engaged in solving them for the benefit of all industry.

To see what has happened to the grinding wheel industry in the past two years it is only necessary to briefly sketch what one company has been doing to keep pace with the enormously increased demand, the Norton Company, Worcester, Mass., one of the oldest and largest of the artificial abrasive and grinding wheel manufacturers. This company makes both the oxide of aluminum and the carbide of silicon types of artificial abrasives under the trade names of Alundum and Crystolon. The ore from which the aluminous abrasive is made is mined at Bauxite, Ark., where the company has a plant for the calcining and first preparation of the bauxite ore. At Niagara Falls and at Chippawa, Canada, it makes the artificial abrasives, using the power generated by the falls to supply its large needs for electric current for use in the electric furnaces. All the wheels are made at the Worcester plant.

Since Jan. 1, 1915, the fixed assets—buildings, land and equipment—have been increased approximately four times; the number of hands has grown from about 900 to almost 4000; and the kiln capacity has been more than doubled. Thus has this one plant responded to the demands of the metal-working industries.

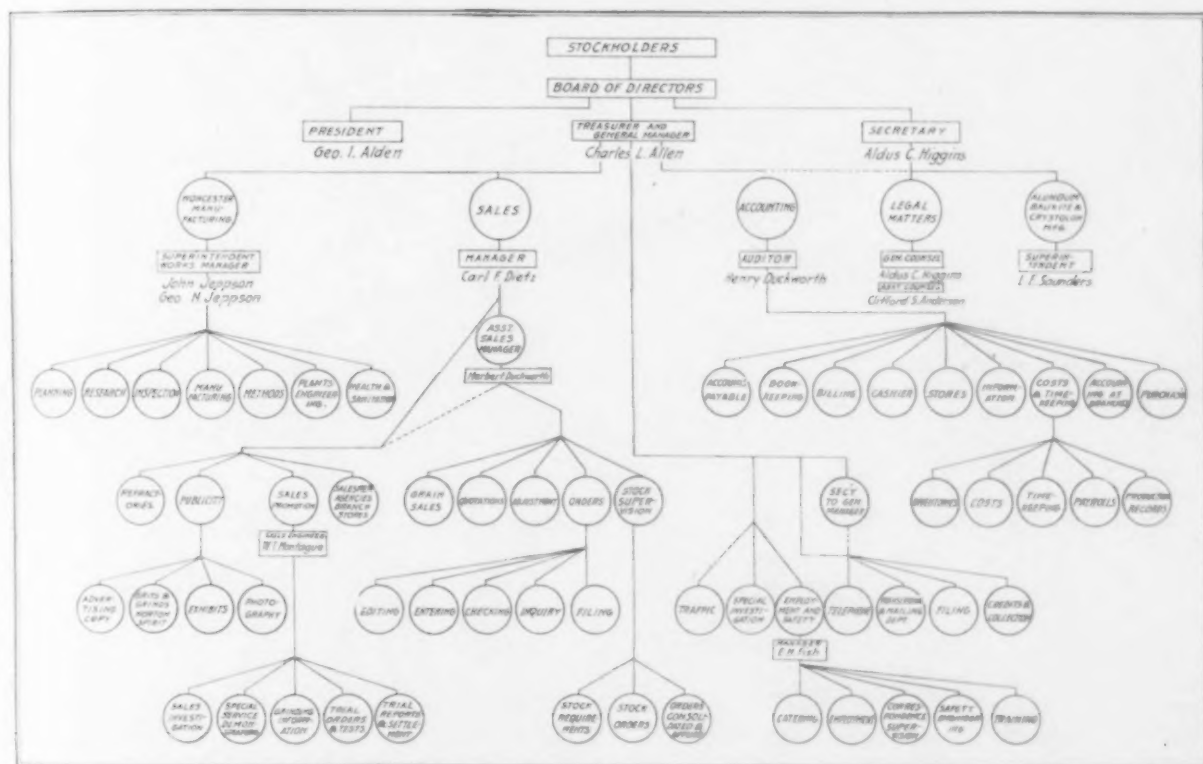
The Manufacturing Organization

While, as the chart shows, the organization plan is not essentially different from other manufacturing organizations, it has been developed in several details to noteworthy points of efficient service. In the production section of the organization are found some features that have been evolved to meet the special needs of this business. The planning department is responsible for the progress of the work in process. It maintains a record of all production orders during each step of their progress and from

see that standard methods of manufacturing are maintained and suggests changes and improvements in the various operations. It makes time studies and sets the piece rates, subject to the approval of the works manager.

The research department has extensive laboratories and, as the business is highly technical in character, is an important part of the organization. It trains the field demonstrators and sends them out to help customers solve their problems when so instructed by the sales department. In its laboratory and field work it is an important service factor and in this connection is a most useful adjunct of the sales service. It has been the pioneer in much of the development of grinding both in the production of special wheels and in the opening of new fields of usefulness for grinding wheels.

The drafting division of the plant's engineering department is divided into four sections—buildings,



its records furnishes to the sales department the dates upon which shipments of goods which must be manufactured can be promised. It is the aim of the company to keep sufficiently large stock on hand of finished or partially finished wheels so that orders for standard sizes, grain and grade can be filled from stock. Wheels not standard are made only on order. The planning department assigns work to the various departments by issuing the manufacturing orders to the department and the return of the order notifies the planning department that the work is completed. The record of the progress of each order is kept on the back of a file copy of the order. This department also notifies the abrasive department of the future requirements for grain so that the abrasive mill can be guided in its crushing operations by these notices as to the size and quantities required. The planning department keeps a man permanently in all the larger departments to keep orders together and to see that no order is unduly delayed.

A methods department is charged with oversight of the operating methods. It constantly investigates the various manufacturing departments to

equipment, wheels and surveying—and each section has a planning draftsman at its head, all under a chief draftsman. A service planning section sees that work is done on the scheduled time, is responsible for the repair men and the repair material getting on the job at the same time, and watches and reports on the progress of the various jobs. The master mechanic, the power department, the watchmen and the garage are under the charge of the plant engineer. The master mechanic is in charge of the machine shop, the carpenter shop and the general department, including masonry, general labor, elevators and stable. The power department has charge of power equipment, piping and electrical equipment and wiring. There is one chief watchman, two sergeants and thirty watchmen.

The department of health and sanitation comes under the works manager but operates in close connection with the department of employment and safety. This department is under a chief surgeon, who has three assistant doctors, four male nurses on day duty and one male nurse on night duty, one woman nurse who has oversight of the women employees and assumes in part the

duties of a matron, and one clerk. The hospital is thoroughly equipped to take care of accidents and sickness cases for first treatment. Patients unable to return to work are sent to the city hospitals or to their homes. All new employees are given a searching physical examination and workmen who have developed heart or other weaknesses are regularly examined to see that their work is not increasing their ailment. Every effort is made to conserve the experience of workmen and, where advisable, easier employment is found, if possible, for men engaged in labor which is aggravating their ailment. The hospital staff follows up accident cases at the employee's home or at the city hospital until he is able to come to the shop hospital for treatment. In sickness only first aid is given and the hospital staff does not make house calls. The sanitation of the workroom and toilets is under the charge of the hospital and regular inspections are made.

How Orders Are Handled

The service factor is given much attention in the sales department. The order division alone comprises a force of sixty clerks. After an incoming order has been passed by the credit department, it is turned over to the order editors, who look up from the files the records of previous similar orders and write the customer if further details are necessary before the order can be filled. From the editors the order is passed to the stock supervision division which advises the order department if the order can be shipped from stock or from stock orders in process and the shipping date, or reports that the wheels ordered must be made. The orders are then passed to the transcribing section of the order department which acknowledges the order to the customer and makes out one original order and four duplicates on the factory form. These forms then go to the checking section which checks the forms against the original order and separates them for distribution. The original order goes into the general file.

The routing of the first factory order form is this: To billing department for list price, to planning department, to stock department or manufacturing department, to packing and shipping, to service section (order tracing) of order division where the shipping date is placed on the third copy, to stock supervision for notation on its records, to billing department for invoicing, to planning department for shipping record, to permanent file in order division under alphabetical index. The second copy goes directly to the order division file under a numerical index. The third copy is held by the service section of order division and destroyed when order is completed. The fourth copy goes to the salesman. The fifth copy goes to the billing department for its records and then to file in the planning department.

The stock supervision division keeps accurate records of stock on hand and in process and issues stock orders. One stock ledger has sheets for standard stock wheels showing the balance on hand, on order, and the date in the kiln. These sheets also show the minimum stock requirement, the minimum factory order and the record of orders applied from wheels in process. In the same binder are also placed sheets of another color which show wheels in stock which are not standard stock requirements. Another binder contains forms which show wheels sold that are not standard stock wheels. If the record of any wheel in this binder shows that it is selling regularly in sufficient volume, it is made a standard stock wheel.

A section of the sales department gives its whole

attention to the making of quotations and another section takes care of all reports of dissatisfaction and all other complaints from customers and makes a report after investigation upon every complaint. This section corresponds with the customer and endeavors to remove all causes for complaint and to correct the matter complained of to the customer's satisfaction.

The publicity division has charge of all advertising, publications and exhibits. The sales promotion division has charge of trials and demonstrations, investigates conditions in the various sales fields and compiles information of grinding operations and methods.

The accounting department is thoroughly modern. The bookkeeping is done wholly upon machines and no hand-written records are made. Graphic charts are made of departmental costs in the various production departments and these charts are submitted to the foremen for their guidance. Labor costs are gathered upon the Hollerith machine from a special form of job ticket. Other costs are figured upon adding machines for which a special desk has been designed and built. Addressing machines are used for heads of ledger pages and other similar work, including the marking of pay envelopes. There is a timekeeper in each department under a chief timekeeper. These timekeepers fill out the description of the job on the job cards. Complete records are kept of orders placed for raw materials, cars received and cars in transit. The inventory cards are checked weekly by a rough physical inventory and a weekly report made of each major supply to show the amount on order, the amount in transit, the amount on hand and the probable period before the supply will be exhausted. There is a chief paymaster and the shop force is divided into four sections so that there are four pay-days during the week.

Procedure in Employment

Foremen desiring men send a requisition to the employment and safety department. An applicant for work is seated in a reception room until his turn comes. He is first interviewed to gain a general idea of his availability. If there appears to be a possible opening for him he is held for further interview. The employment supervisor or his assistant then interviews the man and if he is needed he is given a physical examination by one of the hospital staff. He steps directly from the employment office into an examining booth and from that into an inner room. After the records are filled out he is conducted by a boy to the foreman who has the final decision as to whether the man shall be employed. The number of rejections by foremen is very small. The boy then takes the man to the timekeeper who explains the shop routine to him. The boy then gives him a temporary pass, good until the first pay-day, and shows him the factory entrance which he will use. In his first pay envelope he receives a regular pass which is in the form of a small card bound with tin. This card has thirteen numbers on it and the paymaster punches out a number on each pay-day. A new pass is issued each quarter.

The employment section of this department has two interviewers, one clerk, two errand boys and two special men. One of these men is provided with an automobile and follows up men who are reported by the foreman to be absent three days from their work. The other special man spends all his time interviewing workmen and their foremen. He gets a report from the foreman which is in effect a report on both his suitability for his present

work and his capacity for earning more pay on the present job or on some other one. Each man is reported on once every six months. Interesting discoveries are constantly being made by this tracer, especially in his own talks with the employees. Men are transferred from one department to another only by the consent of the general foreman and the two foremen concerned. Men are not discharged directly by the foreman but the employee is sent to the employment department with a special report slip which may request his discharge. If the foreman is wrong, it is usually easy to convince him. Occasionally a man is placed in some other department.

Other Work of Employment and Safety Department

There are five sections of the employment and safety department: catering, employment, correspondence supervision, safety engineering, and training. There are two special features of the catering department. One is the use of a shipping case, modeled after a fireless cooker, which is used to transport hot coffee, soups, etc., from the central kitchen to the various lunch rooms. These are loaded on a motor truck at 11.50 a. m. and sent to the several lunch rooms. A midnight service is also maintained. The other feature is the establishment of several milk stations in the plant to which the workmen are permitted to go at will and purchase milk or ginger ale or soda. Nine drink tickets are sold for a quarter. About 100 gal. of milk and 20 cases of soda are sold each day.

A correspondence supervisor watches the work of each dictator and transcriber and makes suggestions of the changes necessary to make a letter clear or courteous or to properly express the spirit of the company. The training division conducts various courses for students who are preparing for the sales department or other departments of the company. These courses are varied to meet the individual need of the student for the work he is to take up and the length of the courses varies according to the work to be accomplished.

The safety engineering division inspects frequently to see that needed mechanical safeguards are installed. If the cost is small it is authorized to order them. If the cost is large, the matter is taken up with a central safety committee composed of several department heads. Educational work is constantly carried on and a suggestion system is in use. About 60 per cent of the many suggestions received are found available and are adopted. A watch fob is awarded for the first suggestion sent in by an employee and adopted; a pair of cuff links for the second. Both bear the company's trademark

in enamel. The safety engineer and the central safety committee select the three best suggestions each month for which cash prizes are awarded. This section takes care of all the clerical work incidental to accidents, makes all compensation payments and visits the man's home if necessary to do so. It also has charge of fire and elevator inspections, which are under the charge of one man. The fire department has four hose companies, four inside hose and salvage companies and four chemical companies.

A feature of this organization which does not appear on the organization chart is the employment of committees to analyze the many problems arising in a large business. These committees vary greatly in their functions and in the composition of their personnel. The fundamental idea which has been effectively worked out is to establish intra—or

inter—departmental committees as the scope of the subjects studied may require. The major committees form a close link between the departments and do much to eliminate friction and to align the whole organization in active co-operation to achieve a definite object. The committees analyze the problems and present a digest of the salient facts to the department heads or chief executives. This plan enables the management to avoid exhaustive study of details and yet keep in close touch with every phase of the business.

The company has gone largely into the housing field and has one of the notable industrial villages of the country. It also is promoting an interest in gardens and a prosperous Norton Agricultural Society has resulted. It has been preparing 20 acres of farm land as a garden site for next year and the gardens are now nearly all allotted.

The same activities that have been going on at Worcester have been duplicated on a smaller scale at the other plants of the company. The plant at Chippawa, Canada, has been increased practically four times in size and the plant at Niagara Falls to the limit of land and power available. The raw material plant at Bauxite, Ark., has been enlarged to keep pace and is about four times its former size. About 30 houses have been built at Chippawa of a character nearly as good as those at Worcester and several houses have been erected at Bauxite for foremen.

The receivers for the Central Iron & Steel Company, Harrisburg, Pa., in a report to the court, state that the cost of dismantling the Chesapeake Nail Works was \$3,915.70, and the value of the scrap obtained \$14,896.91. The cost of the dismantling is to be paid out of the sum obtained for the scrap, and the balance used by the company for improvements to the open-hearth furnaces.

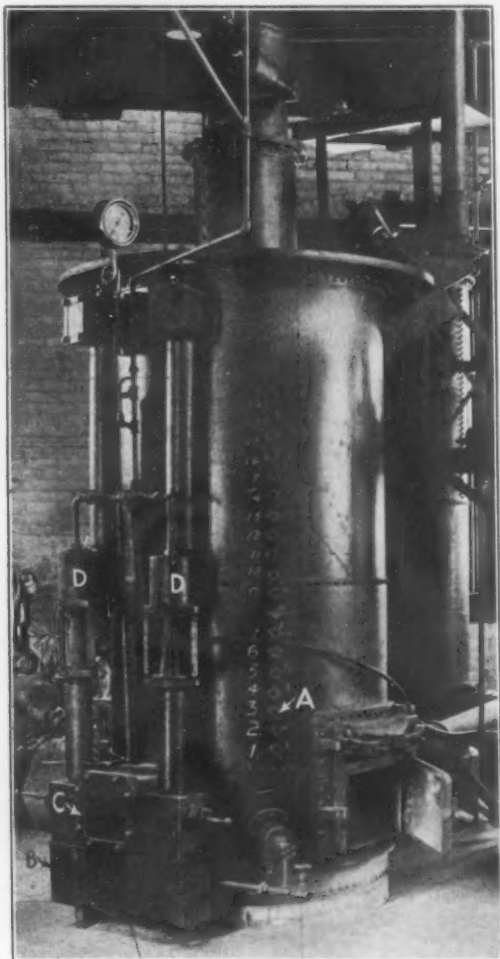


One of the several milk stations scattered throughout the plant. These milk stations have been found effective in bridging over the usual fatigue periods and at the present time over 100 gallons of milk and 20 cases of soft drinks are sold each day. Men are permitted to leave their work and go to these milk stations at any time they desire.

BITUMINOUS GAS PRODUCER*

An Experimental Unit of the Recirculating Type Giving a Tar-Free Product

As the result of experimental work begun at the University of Wisconsin and continued at Purdue University the author has developed and patented a recirculating gas producer admitting the use of bituminous fuel. The coal is trapped in at the top, the only air inlet being below the grates. The combustion all takes place immediately above the grates. The finished gas is drawn



The Experimental 50-Hp. Recirculating Gas Producer for Bituminous Fuels Installed in the Laboratory of Purdue University

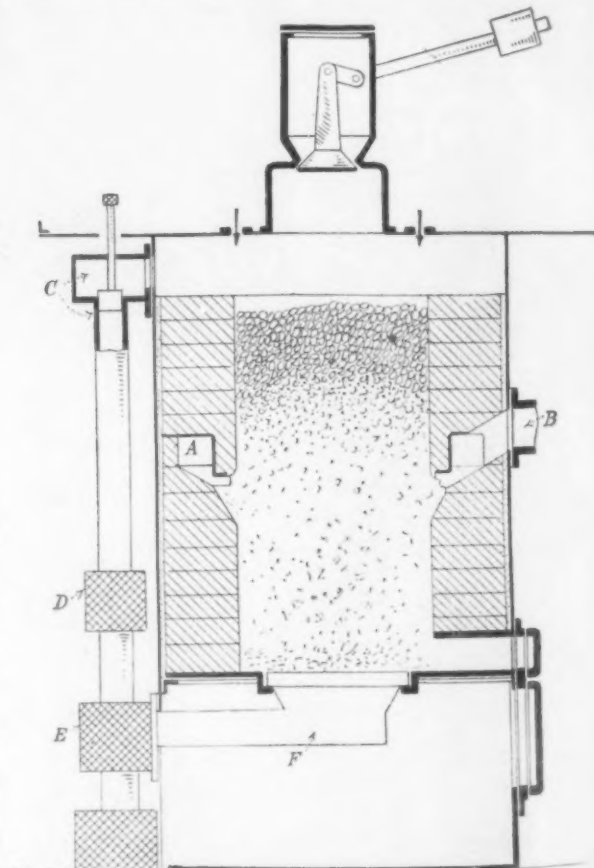
off from the fuel column into the annular chamber *A*, which is formed in the firebrick lining of the producer. From here it passes out through the pipe *B*. The products of distillation and the other recirculated gases are drawn into the pipe *C* by the steam blower *D*. These gases are then delivered into the header *E*, and from there into the distributor *F*. This distributor is so constructed as to deliver an equal amount of the recirculated gases to every part of the grate area, and in such a way that the gas burns as it mixes with the air, largely in the lower part of the combustion zone of the fuel. The recirculated gases burn to CO_2 and H_2O , and in passing through the incandescent zone above, the CO_2 , taking up one more carbon atom, is changed into CO and the H_2O is split up into free H_2 and CO . Thus the finished gas obtained from the tars and the other hydrocarbons is the same as that from anthracite coal, and instead of being wasted the tars are converted into useful gas. The gas from this producer should therefore be free from the fluctuating hydrocarbon content that has been the source of so much inconvenience in connection with the gas from most bituminous plants.

The halftone is from a photograph of a 50-hp. in-

stallation of this producer in the laboratories of Purdue University, Lafayette, Ind., for experimental purposes. Peepholes *A* are provided to enable the operator to examine the temperature of the fuel column. In the hottest part, where the temperature changes are the most important, this is especially easy. A tube with a rod inside of it may be thrust into the center of the producer, and the rod removed. By looking through the tube the temperature of the fuel at the end of the tube may be estimated. By drawing the tube out slowly and watching the temperature at its end, comparatively slight differences in temperature between the outside and the center of the fuel column may be detected. This is often of great importance in interpreting producer performance. These peepholes are drilled through the shell and tapped $\frac{3}{4}$ -in. pipe size. Nipples 6 in. long are screwed into these holes and are capped on their outer ends by standard unions with glass packed in them. The small outlets shown at the sides of many of the $\frac{3}{4}$ -in. pipes are used to draw off samples of the gas to be tested for tar.

The trap *B* is filled with water and catches any tar that may be thrown down in the steam blowers or the recirculating pipes. The header *C* communicates with the gas-distributing device under the grates. The steam blowers *D* and the recirculating pipes are in duplicate, one being used and one held in reserve. The gas from this plant is cooled in a coke-filled scrubber. From this scrubber the gas goes directly to a 43-hp. Fairbanks-Morse engine.

If three things are accomplished the gas will be free from tar: (1) all of the tar must be driven out of the fuel while it is still above the openings which communicate with the annular chamber, (2) all of the tarry vapors driven out of the fuel in the distillation zone must be drawn out and recirculated, and (3) the recirculated gas must not be allowed to form a cold path for itself between the grates and the outlet on the one hand, nor form an explosive mixture with the entering air on the other, as the former would allow the tars to get into the



A Sectional Elevation of the Producer Showing the General Details of Construction

finished gas, and the latter would cause explosions which might prove serious.

Inability to meet the first requirement has been the cause of failure of several recirculating producers. Coal is a poor conductor of heat, and little heat can pass by

*From a paper by O. C. Berry, Purdue University, Lafayette, Ind., presented at the annual meeting of the American Society of Mechanical Engineers, New York, Dec. 7, 1916.

conduction from one lump of coal to another. The heat-distribution in the fuel column of a standard up-draft plant is due to the hot gases from the incandescent zone that pass up through the entire fuel column on the way out. In the recirculating producer the finished gas is drawn out of the fuel column at about mid-height. If the only gases that pass through the fuel above this point are the products of distillation the heat-carrying medium will be absent above the annular chamber, and the coal will remain cold until after it passes this point.

To overcome this a blower of sufficient capacity must be used to recirculate a considerable part of the hot gases from the incandescent zone along with the products of distillation. It is thereby possible to maintain as high temperatures in the fuel column at the top of a recirculating producer as in the up-draft producer, and the coal may be heated until the last trace of tar has been driven off before it reaches the gas discharge level.

This positive stream of gas passing from the bottom of the producer to the top past the annular chamber also enables the producer to meet the second requirement, as it will prevent any of the products of distillation that are driven off from the coal above the discharge level from backing up and passing out at the discharge.

On the third requirement is where many recirculating producers have failed. The gases from any given point in the grate area will tend to establish their own individual path between the grates and the outlet. If they are inert, or do not mix with air and burn in the combustion zone, or, mixed with air, do not burn the coal in the combustion zone, they will not have any heat of combustion with which to establish an incandescent zone. They will therefore form a cold path for themselves right through the zone that should be incandescent, and escape through the discharge outlet unburned and uncracked. To avoid this, the recirculated gases must be evenly distributed over the entire grate area. To prevent the formation of an explosive mixture, the gases and air must burn as they mix. In this producer this is accomplished by having the gas introduced into the air in the restricted area between the grates, thus preventing them from backing up and mixing with the air below the grates.

(1) The combustion takes place as in a standard up-draft anthracite plant. The air all comes from underneath and passes through the ash before reaching the fuel. The last trace of carbon in the hot ash at the bottom of the combustion zone is exposed to the pure air which supports the combustion, so all of it should be burned up. In either the anthracite plant or the recirculating plant the quantity of carbon in the ash is due largely to the care with which the fire has been tended, and should be small.

(2) All of the tarry vapors are burned in a highly oxidizing atmosphere, so no lampblack is formed.

(3) The fuel being burned after it has passed through the incandescent zone, as it is in the standard anthracite plant, much of the tendency to clinker is avoided. No worse clinkers are produced in this plant than in the anthracite producer; and with proper care and a good coal they can be avoided entirely.

(4) The temperature necessary to eliminate the tar in the coal is never more than 1250 deg. Fahr. The gases will have to leave the producer at a temperature somewhat higher than this, say at 1500 to 1600 deg. Still considerably less is lost in the sensible heat in the gas.

(5) The ash can be removed from the producer while it is in operation, and the plant is capable of continuous operation, the length of the run being limited only by the life of the firebrick lining.

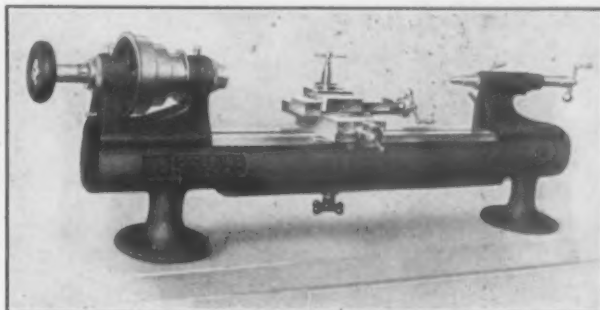
The Oklahoma Iron Works, Tulsa, Okla., has found its business growing so rapidly that it has been deemed advisable to divide the company into different corporations. Three separate companies have been formed, known as Oklahoma Iron Works, Oklahoma Tool & Supply Company and Oklahoma Structural Steel Company. The first named will take care exclusively of the manufacturing and wholesale end of the organization, so far as its own products are concerned; the second will handle all retail and jobbing business as regards oil-well supplies, tools, mill supplies, etc., and the third will have charge of designing and erecting steel structures. J. W. Sloan will be president of each company, A. F. Bourne will be secretary and treasurer and E. A. Shaw will be purchasing agent.

Bench Lathe with 7-In. Swing

A bench lathe having a special continuous oiling system for the spindle bearings has been brought out by H. W. Cotton, Inc., 233 Broadway, New York City. In addition to being employed as a lathe, it can also be used for grinding work.

The bed of the lathe is 36 in. long and is made slightly wider than is the general practice, this construction, it is emphasized, tending to give a rigid bed. The spindle is of the customary 3 and 45 deg. angle type, and the collet employed has a capacity for work up to $\frac{5}{8}$ in. in diameter.

Lubrication of the spindle is accomplished by a channel extending around the outside of the headstock bearings. From the oil well in the headstock the oil is carried to the spindle through a piece of felt placed in a slot in the bottom of the bearing and extending to the spindle. This arrangement, it is pointed out, permits any foreign matter which may be washed into the oil



This 7-In. Bench Lathe Has a Special Arrangement of Oil Channels and a Piece of Felt to Lubricate the Spindle Bearings Continuously and Prevent Grit from Causing Trouble

chamber to settle at the bottom and at the same time prevents grit from reaching the bearings.

The construction of the slide rest has been strengthened, and distinct and easily read graduations are provided. A two or three speed countershaft is employed for driving the lathe, and a 12-in. grooved pulley is furnished for use with the customary grinding attachments when grinding work is to be done.

Corrosion of Cast Iron

Cast iron imbedded in moist soil is subject to a peculiar form of corrosion known as "graphitization," "iron cancers," etc., in which it is converted locally into a soft, friable, gray mass, according to B. Bauer and E. Wetzel, two German authorities, as quoted by the *Journal of the Society of Chemical Industry*. The authors have investigated a number of cases of corrosion of this type and also made experiments with the object of producing similar effects in laboratory tests. Their results indicate that the fundamental condition for the production of corrosion of this kind is the presence of water in the liquid state. The phenomenon is usually associated with gray cast iron, but white cast iron may be corroded in a similar manner. The corrosion is accelerated by the application of an electric current—for example, by stray currents in the soil—but also takes place, though much more slowly, in the absence of external electric currents. The oxidation products of the iron, in a spongy condition at first, are retained in place by the network of graphite in gray cast iron, or of cementite in white iron, and are gradually agglomerated to a more or less firm mass. In gray cast iron the corrosion appears always to proceed from the laminae of graphite and gradually to spread outward.

A water pipe which burst Jan. 19 at the blast furnace of the Mississippi Valley Iron Company, St. Louis, resulted in explosions of molten metal which caused about \$25,000 damage to the plant and may entail a month's shut-down while repairs are being made. No workmen were injured. The ore hoist was wrecked. The furnace only began operations last July.

Progress in Hot-Blast Stove Design*

Question of Brick Sizes, Shape and Spacing—
The Combustion Chamber—Blast Tempera-
tures—Two, Three and Four-Pass Stoves

BY ARTHUR J. BOYNTON

THE combustion chamber with its dividing wall formerly occupied nearly one-half the available space inside the side-combustion two-pass stove. The reason for this is not apparent, since three-pass stoves built at the same time were successfully operated with a combustion chamber having less than half the area.

The Size and Shape of the Combustion Chamber

The area of the combustion chamber has been reduced in later stoves, and would doubtless have been

gas into the checkers. The side combustion chamber therefore retains much of its former shape and size. As a result of this condition propositions to put checkers in the upper part of the combustion chamber have been frequent. This change has been attended with notable improvement in the case of some existing stove installations.

As applied to new construction or complete relining it is readily apparent that no method of putting checkers in the combustion chamber can equal, from the standpoint of available heating surfaces, the reduction of the combustion chamber to an equivalent area and the resultant ability to utilize this space for checkers, which will extend the entire height of the stove instead of only a part of this height. Distribution of gas is therefore the only apparent reason for an enlarged combustion chamber containing checker work. The free area of the combustion chamber has been reduced

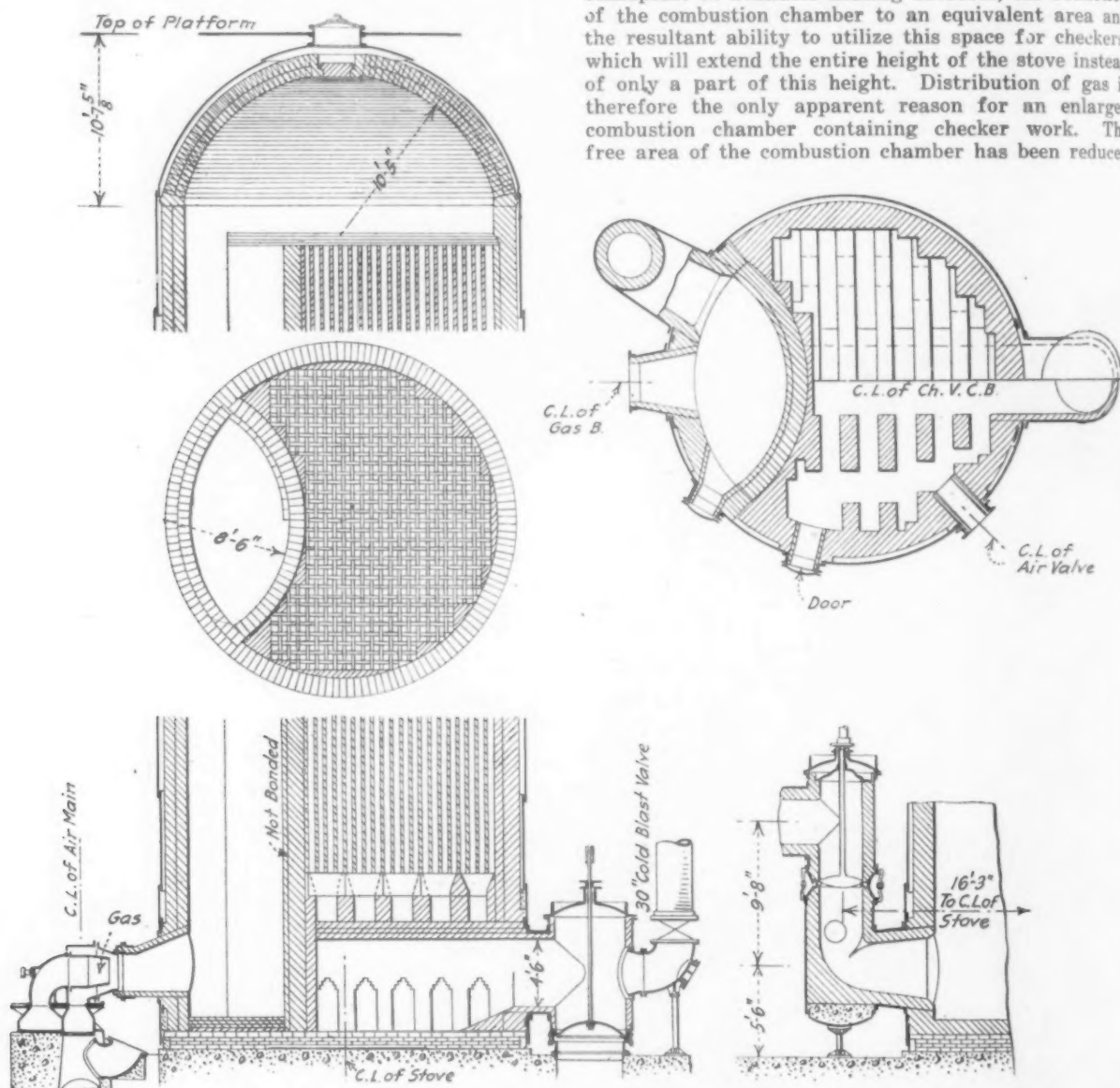


Fig. 7—Two-Pass Side-Combustion Stove, 24 Ft. in Diameter and 110 Ft. High, Built by the United Furnace Company, Canton, Ohio, Three Stoves per Furnace

reduced to its lowest terms, that is, a cylindrical opening located on one side of the stove if it had not been for a natural conservatism on the part of the designers, as to what the effect would be on the distribution of the

to 26.6 sq. ft. in a set of four two-pass side combustion chamber stoves at the South Works of the Illinois Steel Company. This area has been proved to be ample through many years' experience on three-pass stoves.

A very interesting use of space otherwise wasted in the combustion chambers is shown in the construction of the new stoves at Gary Works. Here a saw-tooth construction on the inner side of the upper part

*Continued from THE IRON AGE of Jan. 18, page 205, being a review of a paper read before the American Iron and Steel Institute, St. Louis meeting. The author is superintendent of blast furnaces of the National Tube Company at Lorain, Ohio.

of the combustion chamber wall is employed to increase the heating surface. This involves no corresponding reduction in the area of the checker, since it makes use of the space above the skin wall in the lower part of the combustion chamber.

Structural strength of the combustion chamber walls is of course at a maximum when the chamber is circular. Any displacement of the combustion chamber walls causes a serious displacement in the checkers. Recent construction therefore tends to approach a circle even in side-combustion walls.

Natural or Forced Draft

The increased friction due to smaller checkers and in some cases to the practice of reducing the area of the combustion chamber by installing checker work has led to the adoption of forced draft for air or gas and recently in one installation for both. There is as yet no general tendency in this direction but there are certain difficulties connected with getting the desired combustion with natural draft which are easily solved by forced draft. Washed gas requires for its successful combustion an intimate mixture of gas and air. This is most usually now done by nozzle burners which require high velocity of air or gas, and, in order to facilitate mixture, the smallest possible proportion in the burner. The result is that where the gas goes into the burner at the slight pressure of the main and the air at atmospheric pressure, the products of combustion will show a pressure considerably below that of the atmosphere, in the bottom of the combustion chamber, resulting in apparent necessity for a higher chimney. A marked drop in pressure through the chimney valve produces the same effect, but this is easily remedied by larger valves. An important requisite in a natural draft burner is, therefore, sufficient area for air, and also a sufficiently large opening from the burner into the stove.

For the usual types of stoves the general practice is still to use natural draft. With larger and more economical stoves, the increased friction and lower stack temperatures are requiring higher stacks, which are however well within the limits of possible construction. For such stoves therefore the chief argument for forced draft is one of better combustion. The design of burners in ordinary use has changed but little since Mr. Diehl's full discussion of the subject before the American Iron and Steel Institute a year ago.

The idea of blowing both air and gas into the stove has, however been reduced to practice since that time at the Joliet Works of the Illinois Steel Company. Here an air fan and a gas fan operating on the same shaft and driven by one motor drive air and gas into the burner of the large four-pass stove. The extremely large heating surface, 128,000 sq. ft., and number of passes of this stove made forced combustion a necessity. A consequence of its use however has been an extremely accurate proportioning of gas and air, which can be effected continuously without trusting the judgment of the operator. This arrangement also permits accurate regulation of the amount of gas consumed, according to the necessities of the furnace, and a maximum consumption in comparison with ordinary requirements far greater than that obtainable by natural draft. A second installation for use in two-pass stoves is now nearing completion at Canton, Ohio.

Fire Brick

Stove linings are now practically always made of steam-pressed and hard-burned brick with a tendency to specify first quality brick throughout the stove. These brick withstand the highest temperatures of stove practice without difficulty. There seems to be no good reason, however, why a second quality brick cannot be used in the lower part of the stove. Such brick are stronger, generally truer to shape and are rather more easily heated than the first quality brick.

The chief practical difference, however, is probably the matter of first cost. Experience with these brick has entirely overcome the idea that regenerator brick should be of coarse grind in order more readily to absorb heat. Small checkers require extreme regularity of size and shape, which could hardly be furnished by

the old methods of manufacture. The matter of expansion under heat is of the utmost importance, but most of the standard brands of brick now in use give little trouble in this respect.

Insulation

New stoves are now practically always built with an insulating material between the regular fire brick and

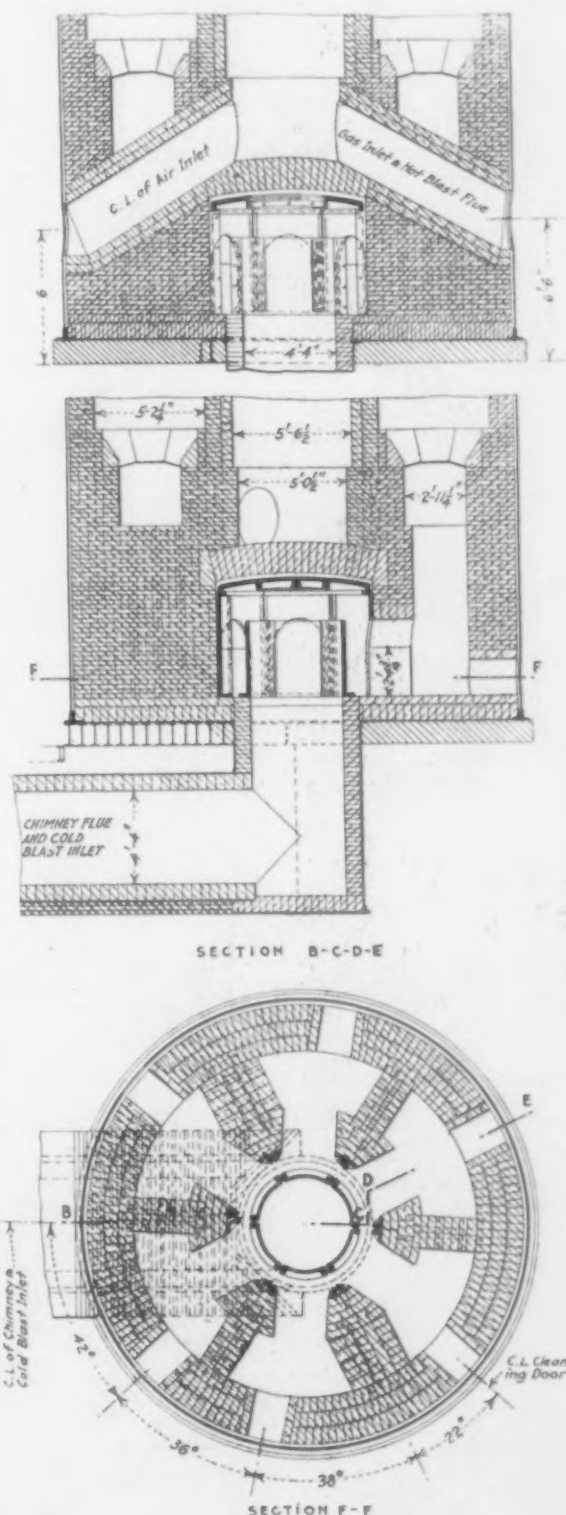


Fig. 8—Two-Pass Center-Combustion Stove, 21 Ft. in Diameter and 96 Ft. High, Built by the Carnegie Steel Company, at Duquesne, Pa.

the shell. This is partially due to the commercial introduction of insulating materials not formerly in common use, but chiefly to a realization that the losses through radiation were generally in excess of 10 per cent of the total quantity of heat furnished to the stoves. The former general practice was to use an average thickness of 2 in. of granulated blast-furnace

slag between the walls and the shell. This was done chiefly to provide for expansion of the brick, but it also acted as an insulator of considerable value.

The materials now commonly employed are asbestos and kieselguhr in various forms. The asbestos is used either in slabs or as asbestos cement. The kieselguhr is used either powdered, in brick made by cutting and drying the kieselguhr rock, or in brick made from powdered kieselguhr. The powdered kieselguhr has in some cases taken the place of the granulated slag; in others this space has been filled either by asbestos slabs, by asbestos cement, or by a mixture of asbestos cement and powdered kieselguhr. Kieselguhr brick when used may be placed inside the expansion space, or built next the shell, and kieselguhr powder used in an expansion space between the kieselguhr brick and the fire brick.

Comparative tests have shown that the insulating value of kieselguhr is somewhat higher than that of

insulation as applied is less than that of the asbestos. The general use of all of these materials is too recent for any conclusion to be drawn as to the ultimate choice of material.

No reliable data are yet at hand as to the actual reduction in heat loss through the application of insulation to stove construction. There is, however, no doubt as to the value of insulation when forming part of walls of standard thickness. Very naturally there seems to be no tendency to reduce the thickness of walls on account of the less heat conduction through the insulation.

Recent two-pass side combustion stoves built with square checkers are typified by installations at the Edgar Thomson Works of the Carnegie Steel Company, at the Joliet Works of the Illinois Steel Company, at the Canton Furnace of the United Furnace Company, and at the Harbor Works of the Inland Steel Com-

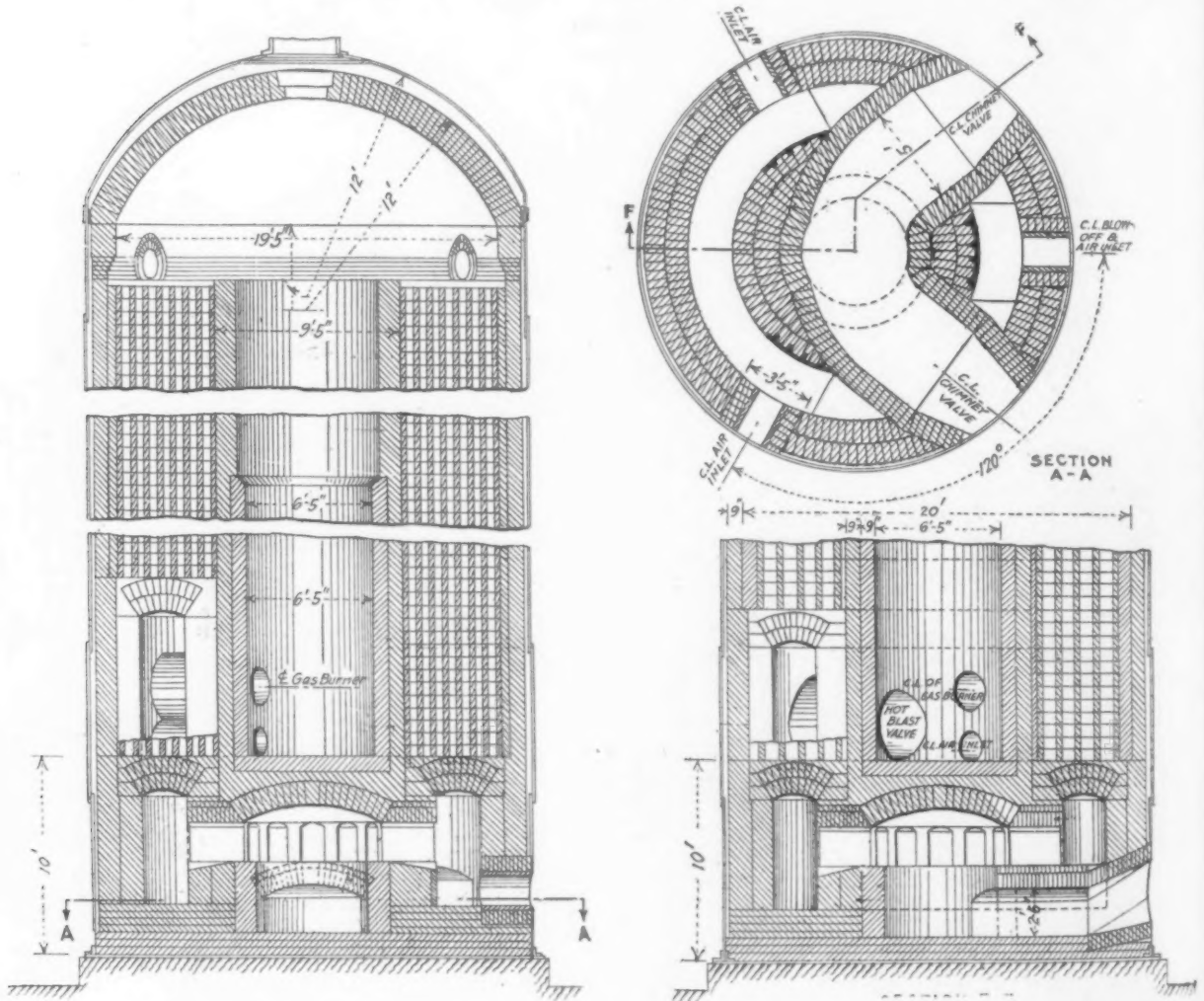


Fig. 9—Two-Pass Center-Combustion Stove, Built by the Illinois Steel Company at Joliet, Ill. In this corrugated checkers are used

asbestos for a given thickness. Some designers have preferred the use of asbestos slabs for insulation on the ground that a better mechanical job is obtained by this means. These slabs are made to fit the shell and are provided with an inner cellular space which allows for expansion of the stove lining. This form of insulation is undoubtedly permanent.

An often stated objection to powdered insulation of any kind is its tendency to compact itself inside the stove shell, leaving spaces in the upper part of the stove uninsulated. This objection may be practically overcome for two-pass stoves by building only every second skew back tile of the stove dome against the shell. It has been found that where this is done, shrinkage of insulating material can be made up by additions from the top of the stove. While the kieselguhr brick has a low compressive strength, its light weight makes the strength ample to support a column the height of any ordinary stove. The cost of kieselguhr

pany. Similar stoves with 5½-in. openings and 2½-in. walls have recently been built at the same works. Very complete tests made on the stoves shown give a thermal efficiency of 71.58 per cent with an average blast temperature of 1119 deg. Fahr., and 44,748 cu. ft. of air per minute.

New stoves as built by the United Furnace Company are shown in Fig. 7. Three stoves per furnace are provided by this and in the new construction for the Illinois Steel Company. These are recent installations not yet in operation.

Two-pass center combustion stoves have recently been built by the Carnegie Steel Company at Duquesne, by the Illinois Steel Company at Joliet and by the Gary Works of the Indiana Steel Company. The Duquesne stove is shown in Fig. 8. This construction represents the relining of an existing stove. Tests of the performance of this stove on a basis of four stoves per furnace show a thermal efficiency of 70.3 per cent when heating

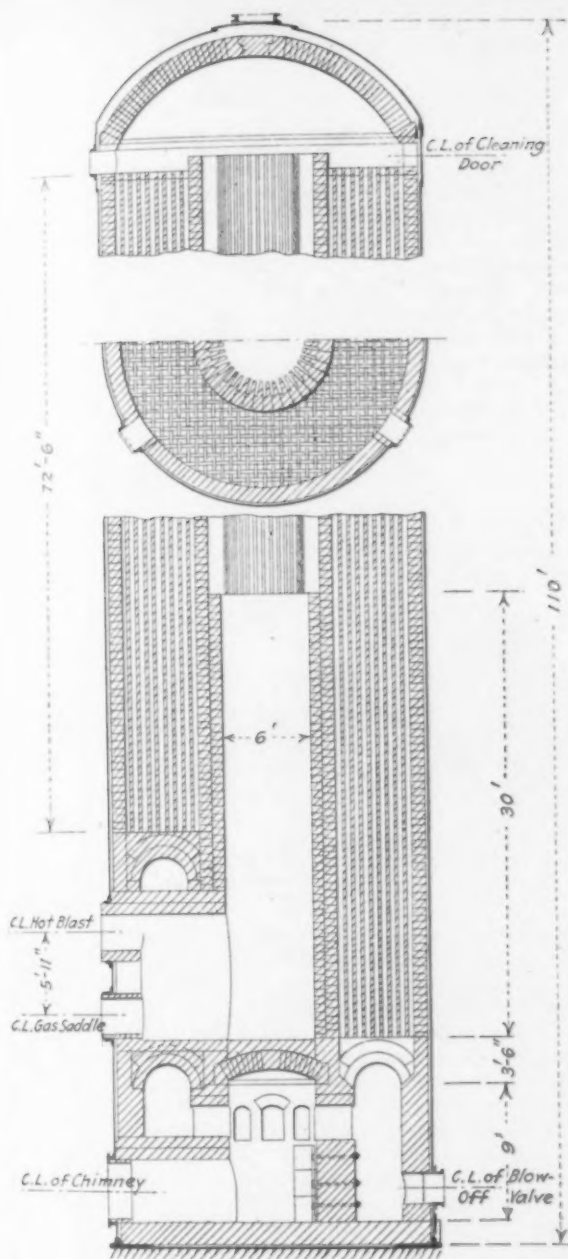


Fig. 10—Two-Pass Center-Combustion 22-Ft. Stove Being Built for Gary Works, with Extended Brick Surface in Upper 58 1/2 Ft. of the First Pass

48,555 cu. ft. of air per minute to a temperature of 1420 deg. Fahr.

The Joliet stove, which also exemplifies the use of corrugated checkers, is shown in Fig. 9. Practice results with these stoves have been fairly comparative with the side combustion stoves at the same plant.

New stoves now under construction at the Gary Works are shown in Fig. 10. Four stoves are being provided per furnace. All of these stoves show great care on the part of the designers in providing for distribution of gas to the chimney valve.

Three-pass stoves are exemplified by recent construction of Corrigan, McKinney & Co., at their River Furnaces, Cleveland, and by rebuilt three-pass stoves at the South Works of the Illinois Steel Company. The Corrigan-McKinney stove is of the standard three-pass stove construction modified by reduction in the size of the checkers. These stoves are built four per furnace.

The rebuilt three-pass stoves at the South Works show the application of square checkers in the second pass to a three-pass stove. These stoves are shown in Fig. 11. Four of these stoves are provided per furnace. Very high blast temperatures have been obtained from both these designs of three-pass stoves, but data as to thermal efficiency are lacking. Excepting the first, all of these designs of stoves are interesting chiefly in their details.

The new stoves at Joliet, however, represent an increase to a size of stove not heretofore operated, together with some novel features of design. The present stoves are rebuilt inside a shell 25 ft. x 100 ft. in height, are a four-pass stove, having a 6-ft. diameter circular side combustion chamber, a fourth pass opposite the combustion chamber with the second pass occupying one side of the stove and the third pass the other. Advantage has been taken of the lessened temperature by reducing the size of the checkers in each successive pass after the second, the idea being not only that the volume and velocity of the gases is decreased, but that the service of the brick will be less severe. The second pass is built of 2-in. brick with 4 1/2-in. square openings; the third pass of 2-in. brick with 3 1/2-in. square openings and the fourth pass of 1 1/2-in. brick with 3-in. openings. The second pass contains 362 checkers, the third 492 and the fourth 490, the areas in the passes being, first, 28 1/4 sq. ft.; second, 51 sq. ft.; third, 41 sq. ft., and fourth, 30 sq. ft. The total heating surface is 128,500 sq. ft.

One of these stoves is capable of heating 40,000 cu. ft. of air per minute to 1300 deg. Fahr. for 2 hr., with a heating period of equal length, two stoves being sufficient to heat blast at this rate. The chimney temperature for this performance is less than 300 deg. Fahr., and the apparent thermal efficiency of the stove neglecting radiation is 92 per cent.

Number and Size of Stoves

The above discussion deals with the general principles in accordance with which recent stoves have been built. The specific questions that confront the designer are with regard to the total heating surface advisable in a set of stoves, and its most advantageous arrangement with regard to number and length of passes per stove and number of stoves.

The demonstration by this installation at Joliet of the practicability of reducing the stack temperature almost to that of the entering blast in a set of stoves whose cost is not greatly in excess of that of stoves showing a much less efficiency, with a use of power in the fan motors corresponding roughly to only 10 per cent of the heat saving due to the lowered stack temperature, together with the ability of these stoves to furnish any required blast temperature, furnishes a new standard of stove performance which is bound to exercise a great influence on future design.

The necessity for fuel conservation which is manifesting itself in large investments for gas engines, for waste-heat boilers operated by the waste gases both from gas engines and from open-hearth furnaces, and for the fullest use of the gas from coke ovens, is equally urgent in compelling not only the use of high blast temperatures, but the greatest possible economy in their generation. The heat actually transmitted to the blast of a modern furnace is about the same as that transmitted to the water in a boiler plant generating 1500 boiler horsepower. The same reasoning which has required higher efficiency of the boiler, and which

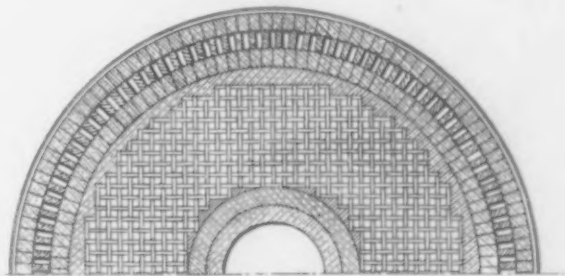


Fig. 11—The Rebuilt Three-Pass Stove of the South Works of the Illinois Steel Company

has in some cases condemned the steam plant for lack of efficiency, will require the highest practicable efficiency from the hot-blast stove.

All available data points to the conclusion that a given heating surface is best arranged both for heat and for economy when grouped in the fewest practicable units of large size. The chief argument for four

stoves is the lessened interruption to operation if a stove goes out of service. On the other hand with only two stoves, the furnace shuts down if one stove goes out of service, and a two-stove equipment will not come for many years, if it comes at all. The three stove layout, however, is elastic enough to prevent severe crippling of the furnace operation when one stove comes off, particularly if it is practicable to force the remaining stove, and in all respects excepting elasticity in operation it is better than an outfit consisting of four stoves. There is, accordingly, a present tendency to build three stoves per furnace.

With regard to the size of the units, the information at hand seems to indicate that a heating surface of 100,000 sq. ft. per stove for three stoves is sufficient for all purposes, although this is necessarily a tentative figure. Such a surface can be contained within a stove of reasonable proportions with any checker sizes now in use, and of ordinary dimensions if the smaller sizes are employed.

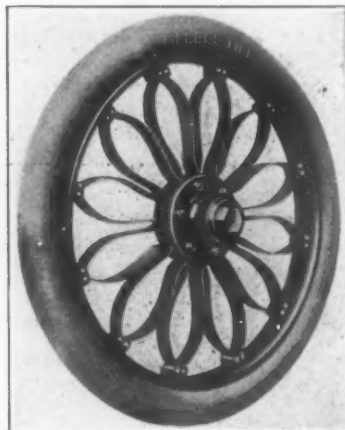
There is no present conclusive reason for advocating one type of stove over another. Two-pass stoves will continue in favor on account of their mechanical simplicity, unless the advantage of length of pass, and increased velocity of air and gas in the stove, as exemplified in the Joliet installation, prove a conclusive reason for changing to a greater number of passes. There are at present no data on which to base a prediction in this regard.

The same uncertainty exists as to the relative advantage of increased height or increased diameter in a two-pass stove. From the standpoint of first cost based on economical use of materials and of space inside the shell, the advantage is in favor of larger diameter. It is improbable that height will be reduced, but any considerable increase in height will require the same reasons that would apply in favor of a four-pass stove.

Recent development may, therefore, be said to have taken form to date in increase in the capacity of units, and a reduction in their number, together with the application of scientific methods to their operation. Blast furnace men are united in looking upon this development as a most promising one for the improvement of their metallurgical practice.

Flat-Spoke Steel Automobile Wheel

A steel wheel for automobiles, motor trucks, motorcycles and aeroplanes is being brought out by the Ackerman Wheel Company, Cleveland, Ohio. It has



Elliptical Spokes of Flat Steel Serve as Springs in This Wheel for Automobiles and Motor Trucks to Absorb the Shock Between the Tire and Axle and Permit Cushion Tires to be Substituted for Pneumatic Ones

flat spokes, elliptical in shape, which form springs and are designed to absorb the shock between the tire and the axle, the resiliency thus provided, it is pointed out, permitting the use of cushion or airless tires in place of pneumatic ones. The spokes are hinged at the outer end by bolts passing through a self-lubricating bushing in a lug that is electrically welded to the metal rim, which is of standard design. Two plates, one on each side, hold the spokes firmly in the hub and are bolted together, forming a solid unit. The spokes are made of chrome vanadium sheet steel that has undergone a special heat treatment. It is stated that tests have shown that the wheel has four times the lateral strength of a wooden wheel, so that it can better stand the lateral thrusts or side strains caused by skidding into curbs, etc. Different

models of the wheel are made. The illustration shows one design with spokes of No. 13 gage steel, 1 3/4 in. wide.

The Ackerman Wheel Company is equipping a manufacturing plant at 2142 Scranton Road, Cleveland, where it has leased 60,000 sq. ft. of floor space which, it is stated, will provide capacity for making 1000 wheels per day. A machine shop and heat-treating department are being installed. At present it will make wheels for pleasure cars and light motor trucks. The company's offices are at 542 Rockefeller Building, Cleveland. Albert H. Ackerman is president and D. D. Walker, secretary. Among the directors is Frederick J. Griffith, vice-president and general manager of the Central Steel Company, Massillon, Ohio.

A Simple Three-Piece Universal Joint

A new type of three-piece universal joint has been placed on the market by the Three-Piece Universal Joint Company, Grand Rapids, Mich. The joint is characterized by simple construction, there being only three working parts, a lubricating system operated by



This Three-Piece Universal Joint Has a Special Locking Arrangement in Which Pins, Bushings and Rivets Are Eliminated and a Lubricating System Operated by Centrifugal Force

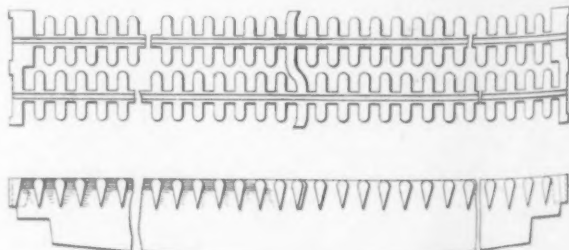
gravity and a special locking arrangement in which pins, bushings and rivets have been eliminated. A large bearing surface is said to be provided which tends toward a long life of the joint.

The joint consists of a center block, a slip-end shaft yoke and a transmission flange yoke of drop-forged steel inclosed in a pressed steel housing. The center block, which is practically spherical, is locked within the grooved yoke housing by making the contact arc of the latter greater than 180 deg. In this way, it is explained, an interlock is formed which will not allow the center block to be ejected, but retains the block in its proper position at all times without employing pins, bushing, rivets or other complicated parts.

The joint is lubricated by the action of centrifugal force which distributes the lubricant from the dead center portion toward the bearings. The bearings of the center block are in the grooved yoke, which keeps the lubricant, it is emphasized, in the proper place at all times. In this way centrifugal force is not permitted to throw the lubricant away from the bearings and at the same time the housing serves to keep all foreign matter out of the working parts of the joint.

Special Grate for Stationary Boilers

The Codd Tank & Specialty Company, 406 West Camden Street, Baltimore, Md., has placed on the market a patented grate bar. The special feature of the bar is the use of rounded teeth or lugs, the advantages claimed



The Teeth of This Special Grate Bar for Marine and Stationary Boilers Are Rounded on Their Upper Faces and Side Edges to Guard Against Breakage as a Result of Being Struck by the Fire Tools and Are Pointed Underneath to Facilitate the Dropping of the Ashes and the Admission of Air

for this arrangement being the deflection of the fire tools and a corresponding decrease in breakage of the bars, the securing of an increased draft and the clearing of the ashes by gravity, with a free-burning fire as a result.

A plan view and a side elevation of the bar, which consists of a pair of parallel longitudinal bars joined at the ends and in the middle by connecting members, are presented in the accompanying drawing. The shape of these end bars may be varied to suit the requirements of any particular installation and, as shown, form shoulders which rest on supports for the grate. The lugs forming the special feature of the bar project at right angles from each side of the longitudinal bars. They have a relatively sharp downward taper forming wide intervening recesses which are relied upon to increase the draft. The upper faces and side edges of the lugs are rounded, as are also the outer ends, this arrangement being relied upon to deflect the fire tools and prevent the breakage of the grate bars, as well as causing the ashes to fall easily. As will be noticed, the lugs are staggered, those of one bar being located opposite the spaces between the lugs of the opposite one. In addition to the double-grate bar, a single form is made. Numerous modifications can be made in the form, proportions or details of construction to adapt the grate to a variety of boiler furnaces.

Filing Machine with a Tilting Head

A filing machine in which all the adjustments are made in the head instead of being accomplished by tilting the table has been developed by the Noble &

Westbrook Mfg. Company, Hartford, Conn. The advantages claimed for this machine include increased production of accurate work at a materially reduced cost for any kind of filing. Graduations are provided to indicate the setting of the head, thus eliminating the use of a bevel square.

The head has an adjustable hardened roller bearing controlled by a knurled screw. This arrangement is relied upon to reduce, if not eliminate, the breakage of files and augment the output of the machine. The stroke of the file can be adjusted between $1\frac{1}{2}$ and $2\frac{1}{2}$ in., and an adjustable chuck is furnished for taking standard straight files without requiring any additional work, such as babbitting, etc. The head is graduated, thus indicating the angularity of the setting to the operator readily without requiring him to use a



Graduations at the Left of the Table Show the Operator the Angle at Which the Head of This Filing Machine Is Set, thus Eliminating the Use of a Bevel Square in Setting

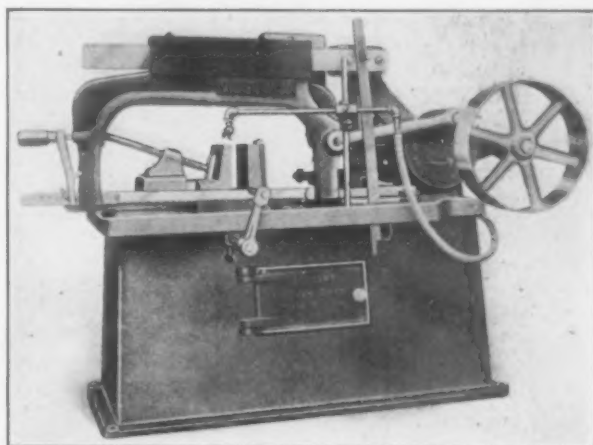
bevel square in setting the machine.

The table is solid, as all the adjustment is in the head above the table. All of the bearings are of phosphor bronze, and as the working parts are entirely above the file, it is pointed out that there is practically no chance for filings to find their way into the bearings and cause wear. A cone pulley is furnished to provide for changing the speed and thus give rates best suited to the different classes of work handled.

Hack Saw Machine with Special Oil Lift

A hack saw machine capable of handling work up to 8 in. square has been placed on the market by the W. Robertson Machine & Foundry Company, Buffalo, N. Y. Among the features of the machine are a special oil compression lift for raising the saw blade on the return stroke, the use of ball valves in the lubricating system and a quick-acting vise swiveling to a maximum of 45 deg.

The machine is built in two types, either mounted on legs or with a box base as illustrated. Single or two speed styles are built for either belt or motor drive. In the box base machine a large receptacle for holding the cutting compound is furnished by the base. A



An Oil Lift of the Compression Type Is Employed to Lift the Blade of This Hack Saw Machine Clear of the Work on the Return Stroke

piston pump, operated by an eccentric, delivers the liquid from the reservoir to the blade, the volume being controlled by a cock at the end of the supply line, while any surplus drawn by the pump is returned to the tank by an automatic operating valve in the pump. Steel balls are used for the valves in the pump and are operated by suction and gravity. In this way, it is pointed out, trouble caused by wear, etc., is eliminated.

The blades used by the machine range from 10 to 17 in. in length, and the cutting is accomplished on the draw stroke, the blade being raised by an oil compression lift on the return. This device consists of a two-cylinder plunger pump submerged in oil, which is contained in a tank in the bed. One plunger is connected and timed with the crankshaft, which has an eccentric, while the other is connected to the frame. A steel ball, which is used as a valve, is located in one of the cylinders. Oil is drawn into the cylinder on the cutting stroke, and at the end the ball seats and the plunger starts downward, thus forcing the opposite plunger connected to the frame to rise and lift the saw blade clear of the work. At the end of the idle stroke the plunger passes a small port in the cylinder wall, thus permitting the oil to escape to the tank and the blade to bear again upon the work. This arrangement, it is emphasized, does away with all chance of the frame falling and breaking the blade. A simple adjustment is provided for varying the lift of the saw from 0 to $\frac{3}{8}$ in.

A quick-acting vise capable of swiveling to 45 deg. for cutting angles is provided for the machine. The bed is milled to insure accurate alignment of the vise and the head. The gears employed are of 8 pitch and are cut from the solid metal. A driving clutch, a friction expanding band with a drop-forged adjusting finger, is mounted in the gear. The bearing of the crank is 6 in. long and extends through the head, while the bearing for the pulley is a sleeve 11 in. long with suitable lubricating facilities.

The height from the floor to the top of the vise bed is $19\frac{1}{4}$ in., while the over-all height is 32 in. The weight on the blade when cutting varies from 0 to 65 lb. The machine occupies a floor space of 14 x 36 in. and the net weight is 550 lb.

Electrical Development in 1916

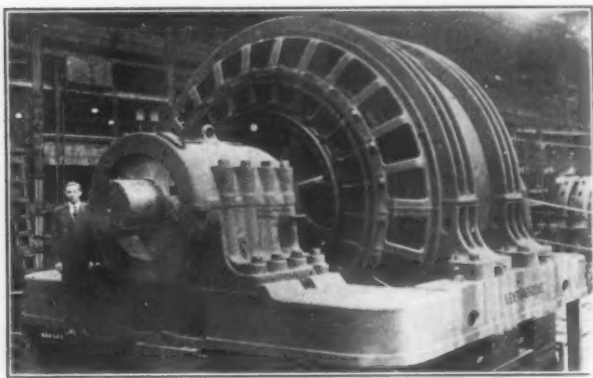
A tremendous volume of manufacturing production has been the outstanding feature of the past year, according to the Westinghouse Electric & Mfg. Company, rather than the development of new systems or designs of electrical machinery. In some lines the increase has been in the size of the units themselves.

Electricity in Steel Mills

According to present indications the demand for electric apparatus for steel mills is even greater than it has been before. In 1916 more than three-fourths of the mills contracted for will be motor driven. Another point of interest in connection with steel mill electrification is the rapidly increasing use of central station power. In the past few years the increase has been fully 50 per cent over the average for any year previous to 1915.

A compilation of the motor installations for driving the main rolls for the period from 1905 to 1915 gives an average of approximately 40,000 hp. per year, while for the last half of the decade the average was 60,000 hp. The increase in 1916 has been to the average of approximately 200,000 hp. This has been accompanied by a decided increase in the average size of the driving motors installed, as the greater majority of the new mills have large capacities.

A contract has been placed for a 7000-hp. 25-cycle motor to drive the 160-in. plate mill at the Gary plant of the Illinois Steel Company. This motor, from the standpoint of torque requirements, is equivalent to a



Some Idea of the Size of This 15,000-Hp. Reversing Electric Motor. Which Is Said to Be the Largest Ever Built and Was Designed for Driving a 35-In. Reversing Blooming Mill in an Open-Hearth Steel Plant. Can Be Obtained by Comparing It with the 6-Ft. Man Standing Alongside of It

10,000-hp. motor of normal requirements. The largest motor now operating, 6500 hp., is also at this plant. The application of motor drive for reversing mills is increasing and a number of orders were secured for these equipments, some of which have a maximum rating of from 15,000 to 18,000 hp. A contract was also received for the largest 60-cycle motor ever built. It is rated at 4200 hp. and operates on a 220-volt circuit. It has a speed of 92 r.p.m. and will drive the bar mill of the United Alloy Steel Company, Canton, Ohio. A contract for what is said to be the largest reversing motor constructed, 15,000 hp., was also placed with the company by the United Steel Alloys Company. This motor is designed for driving 35-in. reversing blooming mills in the open-hearth plant. Some idea of the size of this unit may be gathered from the accompanying illustration, as the man standing by the motor is 6 ft. tall.

In the past year the number of electric furnaces contracted for more than doubled the total number of units in operation prior to Jan. 1, 1916. The average capacity of the furnaces also increased materially.

Central Station Equipment

In turbo-generator work the conspicuous feature has been the great increase in the size of units and there are now on order several having capacities as great as 70,000 kw. with a number ranging from 40,000 to 50,000 kw. in capacity and still more between 20,000 and 35,000 kw. Very large condensers are naturally

required for these turbines and some of them have as much as 56,000 sq. ft. of surface. Steam turbine arrangements for driving direct-current generators have been developed, most of which involve reduction gears to permit the use of high speed turbines running at approximately 6000 r.p.m. with slow-speed direct-current generators of standard design.

Book Review

Cost Accounting: Theory and Practice. By J. Lee Nicholson. Pages xvii + 341, 5½ x 8½ in.; numerous charts. Published by Ronald Press Company, 20 Vesey Street, New York. Price, \$4.

This book, which is one in a series on accounting, deals with the various matters which constitute cost accounting. As the author states in his preface, the book does not deal with factory organization or efficiency methods, but purports rather to be a reference book covering the practical parts of cost accounting.

Opening with a concise statement as to cost finding and its functions, the author proceeds to discuss the various items which constitute the elements of costs, such as direct and indirect charges, and the various fixed charges which are found in all establishments. A short chapter discussing interest in its relation to cost follows, and then are set forth the principles and general methods of cost finding. This chapter disposes of the "machine cost" method in a manner calculated to attract deserving notice.

The various methods of distributing indirect expenses, the various wages systems in vogue to-day, the methods of recording the material and labor costs, and compiling the cost data are considered in great detail. A brief discussion follows on the "tying in" of the factory costs into control accounts and administrative and selling expenses.

Having discussed the main features of cost accounting, the author proceeds to treat the subject from the standpoint of installing a cost-accounting system, taking up at length with the procedure of examining a plant and devising a cost system applicable to it. To this end, illustrations of forms covering the details required for costs are given, with brief discussion of each. Unfortunately many of the illustrations are not so complete and modern as might be desired, but if studied in conjunction with their description will prove useful to those deeply interested in the subject of cost accounting.

E. C. R.

A Suggestion in Metal Casting

The Syracuse Smelting Works, Brooklyn, N. Y., gives the following interesting information in the second edition of its booklet on "Pouring Babbitt Metals and Kindred Subjects." "Liners working loose in the box may be due to shrinkage or poor anchorage. Examine the anchors and, if necessary, cut deeper and make more. If trouble continues, melt down two or three times the required amount of metal, place a heated mandrel in position, pour in the metal, and do not stop pouring when the space between the mandrel and the casting is filled, but let the metal run over freely. The metal, keeping liquid, will thus impart its heat to the housing and the two come into intimate contact and air holes are avoided. When casting in this manner, make the metal somewhat hotter than usual. The metal which flows over may, of course, be gathered up and used again." The booklet is to be had by addressing the company.

Lewis T. Bryant, Commissioner of Labor, New Jersey, has called a series of conferences of State factory inspectors, casualty insurance companies and representative manufacturing interests to devise plans for the adoption of uniform standards for machinery safeguards in the State. The meetings are being held at the State House, Trenton, and special consideration will be given to arrange a set of safeguard standards for emery wheel operation. In this, the commissioner is conferring with grinding wheel manufacturers and large users of such machinery from neighboring States.

Recovery of Benzol from Coke-Oven Gas*

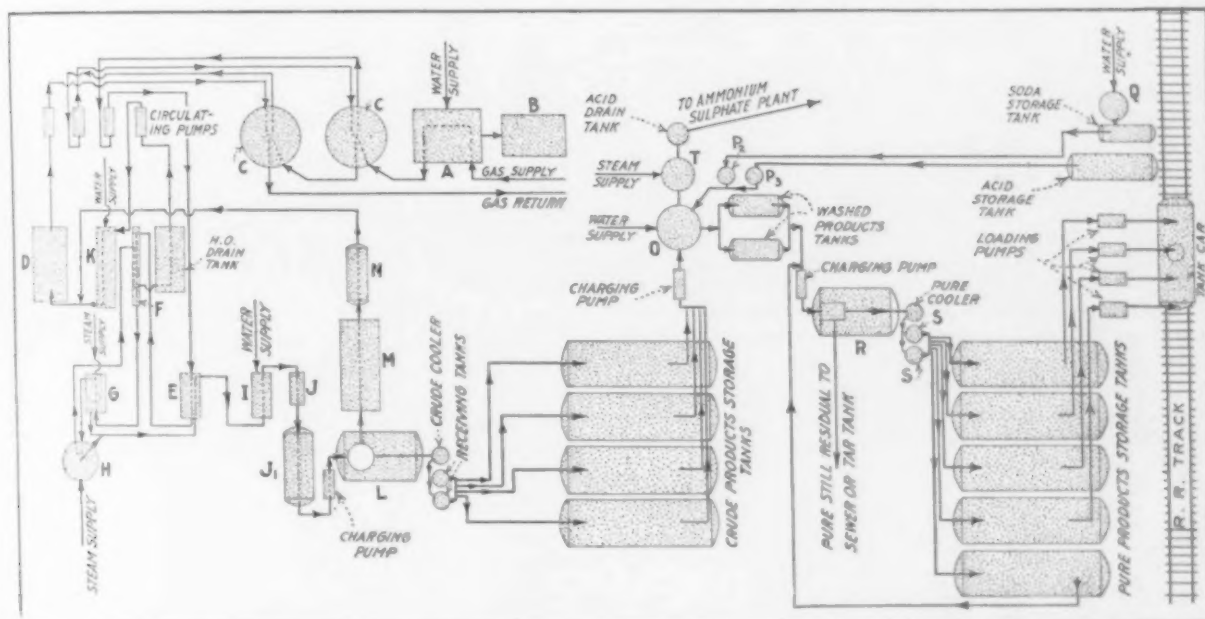
Operating Details of the Process—Benzol After the War—Use as a Motor Fuel—Loss in Calorific Value of Gas

BY F. W. SPERR, JR.

ONE of the most noteworthy achievements in American chemical industry during the last two eventful years has been the rapid development of the recovery of benzol from coal gas, associated principally with the manufacture of by-product coke. The lag in development was due, partly, to a seeming lack in demand for the material, partly to the abundance of petroleum, and partly, also, to the groundless fear that the operations necessary for the recovery of benzol would add too many complications to the manufacture of by-product coke.

At the close of 1913 there were about 16 plants in the United States making light oil from coke-oven gas. It was used for the enrichment of illu-

approximately 30,000,000 tons of coal per year. Making due allowance for the facts that a number of these plants scrub only part of their gas and that part of the benzol is immediately used for enrichment, a conservative estimate would place the present annual light oil production at not less than 40,000,000 gal. Three of these plants are now being enlarged, and eight new plants are in course of construction. The completion of this new work will bring the annual production of light oil up to nearly 50,000,000 gal. The prices of benzene and toluene, although lower than the abnormal figures of two years ago, are still firm, the former at about 55c. per gal. and the latter at about \$1.75 to \$2.50 per gal.



Flow Sheet of a Benzol Plant Showing the Various Steps and Principal Features in the Operation of Recovering Benzol from Coke-Oven Gas

minating gas, leaving a comparatively small amount of material for other purposes. There were only two or three small plants for the manufacture of pure benzene, toluene, etc. From the close of 1914 to the summer of 1915 the prices of benzol products rose with the cessation of foreign supply and the ever-increasing necessities of the munition business, until pure benzene commanded over 80c. per gallon and toluene was sold as high as \$7 per gallon. The response was rapid. The first complete modern plant for the large scale production of pure benzene and toluene was put into operation in May, 1915, and the total production of benzol products in the United States in that year rose to over 22,000,000 gal.—more than twice as much as had been produced the previous year.

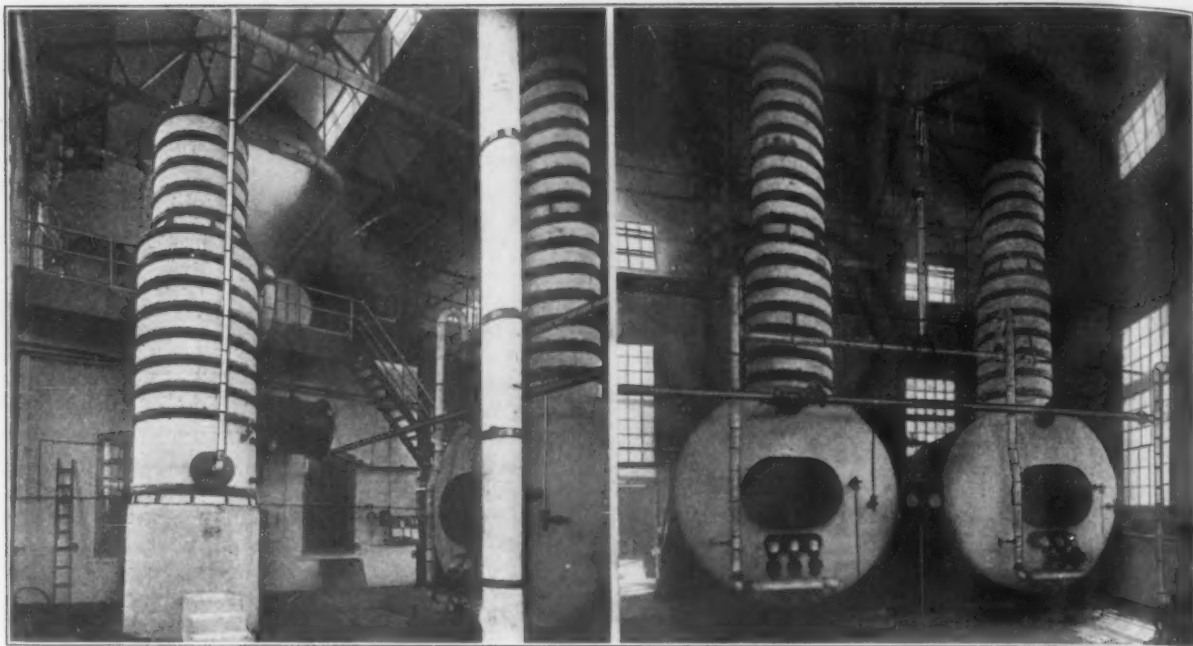
At present (Jan. 1, 1917) there are about 40 benzol recovery plants in operation in connection with by-product coke plants, having a capacity of

It is to be especially noted that the increase of output has been almost altogether in the production of pure products; the amount of unrefined benzol now being made is probably actually less than was made in 1914. It appears probable that at least 80 per cent of the present production is redistilled for the preparation of pure benzene and toluene.

Benzol After the War

The question is frequently asked: "What will become of this vast production of benzol after the war?" It must be remembered that the use of the benzol group of explosives, particularly trinitrotoluol and tetranitroaniline, is by no means confined to military purposes, and their consumption for commercial blasting operations will doubtless increase to a very large extent, because the war has given such a convincing demonstration of their superior qualities. The demand for military explosives is likely to continue on a greater scale than before the war on account of the increased amount of military training in every country, and of the

*From a paper read before the American Institute of Chemical Engineers, New York City, Jan. 12, 1917, and copyrighted by the H. Koppers Company, Pittsburgh, Pa. The author is chief chemist of the company.



Stills Used in Recovering Benzol, Those at the Left Being the Wash Oil and Crude Stills and the Others the Crude and Pure Benzol Stills

recognition of the wisdom of storing large reserve supplies of the principal explosives. It is one of the peculiar merits of trinitrotoluol that it can be stored indefinitely without deterioration. The vast development of American chemical industries insures a market for large quantities of benzol products to be used for synthetic purposes.

Benzol as a Motor Fuel

Its employment as motor fuel, so far as bulk is concerned, bids fair to surpass any other possible source of demand. Previous to the war, Germany used over 50 per cent of its benzol production for the operation of internal combustion engines. J. S. Critchley, President of the British Institution of Automobile Engineers, is quoted as stating that the carburetion of benzol presents no difficulties and

that in actual practice the material gives an increase of mileage of about 20 per cent over gasoline, affording at the same time 12 to 15 per cent more power. A series of tests made in 1913 at Brooklands, England, (*Gas World*, Sept. 6, 1913, Coking and By-Product Section, page 9) showed an average of 5 miles increase per gal.

The demands of the automobile industry alone are so great as to preclude the possibility of any destructive competition between benzol and gasoline. The benzol recovery plants now in course of construction, together with those already operating, will make an annual production of about 50,000,000 gal. of benzol. There are now over 2,000,000 automobiles in operation in this country, so that the contemplated benzol production would give each machine about 25 gal. If all the coke that the country now requires were coked in by-product ovens with benzol recovery apparatus we should expect a total annual benzol production of about 110,000,000 gal. or 55 gal. per machine. This total benzol production would be less than half the amount of gasoline and naphtha exported in 1915.

Other uses of benzol may be rapidly summarized for sake of completeness. Quantities are employed in the manufacture of paints, stains, varnishes and lacquers; in the cleaning industry; in the extraction of grease and fats; as solvents for rubber and for the manufacture of artificial leather and insulating materials. Lastly, may be mentioned one use which should be considered rather as an economic waste than of benefit to the industry. This is for enriching illuminating gas to make it conform with antiquated candle power standards based on the use of flat flame burners. The utilization of mantle burners and the increasing tendency to replace old candle power specifications by calorific standards, already universally adopted in more advanced European practice, will doubtless soon do away with the necessity for gas enrichment, and make it possible for large illuminating gas plants to recover their benzol and utilize it for more rational purposes.

Exclusive of water, the easily condensable vapors remaining in ordinary coke-oven gas after the usual process of condensation and ammonia recovery, amount to about 1 per cent by volume of the gas.



The Gas Coolers and Benzol Scrubbing Towers of a Koppers Benzol Recovery Plant

They might be removed by cooling the gas to a very low temperature and this was actually done on a large scale in Europe some years ago, but the method was handicapped by mechanical difficulties largely due to the separation of ice and has been altogether abandoned. The only practical alternative which can be employed to recover these vapors, without altering their chemical constitution, is to treat the gas with a medium in which the vapors are soluble and from which they may be recovered by simple distillation. Only 5 per cent of the total benzol in the gas is removed with the tar in the condensing plant.

This is the principle of every benzol recovery process in operation at the present time. It appears to have been first employed in 1859 by Vogel, who washed coal gas with fatty oils for recovering the benzol. It is peculiar that Vogel had only the idea of enriching these oils so as to improve their quality for illuminating purposes. Various processes for extracting benzol based on this principle were later patented; but it was not until 1887 that it was put into successful commercial operation. This was done in Germany by F. Brunk, who is generally acknowledged as being the founder of the modern benzol recovery industry.

It is a peculiar circumstance that the condensible hydrocarbon vapors belong almost entirely to the aromatic series. Benzene together with its homologues, toluene and the xylenes constitutes over 85 per cent. The most important generalization that we are able to make is that the maximum yields of benzene and toluene are obtained at moderate coking temperatures. Higher temperatures have a tendency to form more benzene apparently at the expense of the toluene and extremely high temperatures decrease the yields of both benzene and toluene.

The percentages of the more important constituents of typical coke-oven light oil and the amounts usually produced per net ton of coal are given in the following table:

	Per Cent in Light Oil	Gallons Per Ton of Coal
Benzene	66	1.782
Toluene	15	0.405
Xylene	8	0.216
Other substances (principally hydrocarbons)	11	0.297
Total	100	2.700

Operation of a Benzol Plant

In discussing the operation of a benzol recovery plant of modern type I shall deal principally with the Koppers patented process, because I have made a rather special study of this process as being typical of modern practice. All of the coke-oven benzol plants now under construction in America, with possibly one or two exceptions, are of this type.

In America the wash oil generally used to absorb the benzol is a petroleum product usually known as straw oil, of which at least 90 per cent should distil between 250 and 350 deg. C. A good absorbent oil has a specific gravity of less than 0.88 at 15 deg. C., and is readily fluid at 4 deg. C. It contains no naphthalene or pitch, and exerts a good solvent action on benzol. In best practice the amount of benzol absorbed (technically the "enrichment") is kept between 2 and 3 per cent of the absorbing oil. Too high enrichment is likely to lead to loss of benzol and too low enrichment may involve needless consumption of absorbing oil. In European practice heavy tar oils used almost exclusively as absorbing and steam media and such materials may find increasing application in America. Such tar oils should contain less than 7 per cent naphthalene and 90 per cent of the material should distil between 200 and 300 deg. C.

One illustration gives a flow sheet of a benzol plant showing the principal features of operation. Previous to treatment with the absorbing oil the gas should be cooled to a suitable temperature, which may vary from plant to plant. This depends principally upon such factors as its moisture and naphthalene content, temperature of the wash oil and percentage of enrichment desired. This cooling is accomplished by means of the cooler A, which is preferably of the direct contact type. The water not only acts as a cooling medium, but mechanically washes a large portion of the naphthalene out of the gas and carries it into the separating sump B. The cool gas then passes into the benzol washers C. These are tall scrubbing towers of the hurdle type, effecting a very intimate and prolonged contact between gas and oil. The debenzolized gas passes out of the last washer through the return main to its point of consumption.

The fresh wash oil is pumped from the circulating tank D over the scrubbers in an opposite direction to the flow of the gas, maintaining the counter current principle that should be adopted in nearly all scrubbing operations and bringing the fresh washing medium into the scrubbing system at a point where the gas contains the least light oil vapors. The distribution of the wash oil over the tops of the scrubbers is a very important matter, and should be done as uniformly as possible. The enriched wash oil accumulates in tanks, usually located underneath the scrubbers, and is pumped from these to the benzol recovery plant to be heated for the purpose of releasing its benzol constituents. Part of this heating is accomplished in the Koppers system by the utilization of the heat in the hot debenzolized wash oil leaving the still. Two heat economizers are used in this system. The cold oil first enters the heat exchanger E, where it is heated by benzol vapors and steam from the still H, thence it is conducted to a second heat exchanger F, where it receives additional heating by means of hot debenzolized wash oil leaving the still H. It is then still further heated to the maximum temperature desired by means of live steam in a superheater G, from which it passes into the still H. This still is composed of a series of superimposed sections or chambers as in common distillation practice. The heated oil flows down through these sections while steam is blown directly into the lowest section and travels in a direction opposite to that of the oil. The mixture of benzol and water vapor is partially rectified in the upper portion of the still, and then enters the heat exchanger E, as mentioned before, where it is condensed and the partial preheating of the enriched wash oil is effected. The remaining vapors are completely condensed and the total condensate cooled in a water-cooled condenser I. The light oil is separated from the water in the condensate by the separator J.

The debenzolized wash oil, after leaving the still, passes through the heat exchanger F, where it gives up a part of its heat to the enriched wash oil, as stated above. Then it is finally cooled in the water cooler K. The cool oil is then delivered to circulating tank D, thus completing the cycle.

The improvements that have been made in recent practice have to do principally with effecting as great economy as possible of heat in the cycle of gas treatment, distillation and cooling, through which the wash oil passes. In the Koppers system it is calculated that the devices for heat economy reduce the steam consumption in distilling the enriched wash oil by more than 80 per cent. Further economy lies in the saving of cooling water circulation which would be required to cool the debenzolized wash oil.

The light oil is accumulated in a drain tank J, shown in the lower part of the figure, and portions are taken for distillation in still L. This still is usually known as the crude still, the first distillation of the wash oil being made for the purpose of effecting an approximate separation of several fractions of different boiling points preliminary to washing and final rectification. This and subsequent distillations are made intermittently in stills of large capacity (6000 to 12,000 gal.),

(Continued on page 270)

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THE IRON AGE

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A Steel Combine for Exports

What will American steel manufacturers do with permission to combine in the export trade, should the Webb bill become a law? No steps have been taken lately looking to an export organization of the independent manufacturers, but it is likely that such a move will be made if combinations for foreign trade are clearly made lawful. It is well known that several important independent steel companies took up the question of co-operating for the extension of their exports several years ago. It was their belief that the Sherman law did not bar such co-operation, and conferences were held based on that view. Two of the companies, however, were advised by counsel that in the uncertainty as to the construction the courts would put upon their proposal it would be unwise to go ahead. Thereupon the project was abandoned.

At the recent Webb bill hearing before a Senate committee the Senators pressed upon those who appeared before them the definite question, whether they knew of manufacturers who expected to undertake foreign trade in co-operation in case the bill was passed. From the beginning of the agitation of the subject by the Foreign Trade Commission the expectation that American copper producers would take advantage of the act to protect themselves against combinations of European buyers of copper has been urged prominently. It has also been known that the lumber interests of the Pacific coast have organized in a tentative way to extend their exports. Present at the Senate committee hearing also was a representative of the smaller cement manufacturers located near the Atlantic seaboard. From him the committee learned that nine companies had signed articles of incorporation to develop the export trade on a co-operative basis, but two had held out awaiting the passage of the Webb bill. As indicated above, there is now warrant for saying that several independent manufacturers of steel will revive the movement of a few years ago to establish co-operative representation abroad, upon the enactment of the Webb bill.

The basis of such co-operation in steel exports as is now discussed involves not a few important details. One proposal considered at the outset was the bringing together of manufacturers of diverse finished lines, so that the question of restraint of trade could not arise. Such a basis, it

was quickly seen, would be impossible if more than two important manufacturers should combine on exports, as practically all the leading independents directly compete in two or more important finished products, and all would be competitors naturally in the sale of semi-finished steel. An important preliminary of a combination of steel manufacturers competing with the Steel Corporation in exports would be the working out of a plan for the allotment of orders where two or three or more of the co-operating companies were prepared to take foreign business offered in a particular line. The methods of the German cartels in this respect are well known. An important difference in an American combination for exports would be, however, that the latter would not be compensated for low export prices by the profits from agreed prices at home. Here, unlike the German practice, competition on domestic business would still be active. Where the taking of a particular foreign order called for an extremely low price, because of sharp competition from foreign makers, the domestic mill taking such an order might be compensated by a bonus. But bonuses must be paid from export profits. Naturally the only enduring basis of an export combination would be such a volume of profitable business from foreign sources as would make the orders taken at the level of "fighting cost," or even on a "dumping" basis, a not too considerable fraction of the whole.

Where Industry Is Not Under Ban

The move of the Imperial Munitions Board for Canada, in building an electric steel plant at Toronto, equipped with ten six-ton Heroult furnaces, serves at least two important ends. First in importance is the addition of nearly 100,000 tons a year to the steel supply of Canadian munitions works, which are now asking for more steel from American manufacturers than can be supplied. The other is that a profitable outlet is thus afforded for the borings and turnings produced in Canadian shell manufacture, which have been accumulating at the rate of about 100,000 tons a year. They cannot be utilized economically at the open-hearth steel plants, and if blast furnaces used them, as has been done to so considerable an extent in this country, the result would only be so much addition to pig-iron output, leaving the steel situation as before. For some time the Imperial Munitions

Board in Canada, which, while composed of Canadians, is entirely under the direction of the war authorities in London, has been operating a forging plant at Toronto. When the new electric furnaces are provided, another forging plant will be built alongside, supplied directly with steel from these furnaces. When the war ends, the electric furnace and forging outfits, according to present plan, will be sold to private manufacturers, and the government manufacturing enterprise liquidated.

That the discontinuance of government manufacture of steel, once entered upon, should be thus contemplated is in sharp contrast with the working of the official mind on this side of the border. Because of war prices for steel, which prevail the world over, our Secretary of the Navy proposes to build a Government steel plant, paying war prices for it, and having it ready when war prices collapse and steel is likely to be had at less than the Government's cost to make it. The Canadian way of government co-operation with munitions makers and of considering that individual industries should be encouraged and not destroyed has a certain fairness and sanity about it that do not fit the present mood at Washington.

Regulation of Railroad Development

It is a remarkable thing that so little serious attention has been given to the control of railroad development—the increase in railroad facilities required not simply to keep pace with, but to encourage, the development of the country. To some, perhaps, the concept will seem to be a new one. What we have now is control of the manner in which the railroads handle the freight and passenger business offered them. Control of railroad development, by restriction in one direction, encouragement in another, does not exist, except in the most limited way, as, for instance, in restriction of issues of securities and the requirement that certain depreciation accounts be maintained against rolling stock.

It is now 30 years since the original interstate commerce law was enacted and the Interstate Commerce Commission established. In the period the United States has grown wonderfully in material resources and in industrial operations, and in some directions it has grown wiser in the administration of its affairs, but in this respect the growth has not been altogether as great as might have been desired. Instead of the advantages of railroad transportation being so recognized that an increase in facilities should be encouraged, the proper and necessary regulation as to rates has been allowed to operate so that railroad development has been hindered.

It is quite obvious that the suggestion continuously made by the railroads—that they be allowed to charge higher rates and the matter of development be simply left to them—is not fair to the public and could not possibly be expected to work out to the best interests of all. If railroad managers worked purely for the public and not for their stockholders, they would be unable to determine, in many instances, the best manner in which to invest funds for the purpose of providing facilities

to handle an increasing traffic. This is obvious when it is considered that the capacity of a railroad depends upon many things, upon the condition of main line track as to its ability to stand high speeds, its grades, etc., the proportion of second, third and fourth track, the proportion of siding track, the capacity of yards, the number and capacity of cars, the number and capacity of locomotives, and a number of other matters. When a railroad manager is given a certain amount of money to spend—it seems to be rarely that he is—it is largely a question of operation how the money had best be spent, in eliminating a curve, reducing a grade or buying new cars or locomotives, for instance; but there is also the question whether the money should be spent in effecting an immediate increase in the road's capacity, or in providing in a broader manner for the more distant future.

It may be of interest to set down how the railroad system of the United States has grown in a decade in respect to certain elements that affect its capacity. The following percentage increases have occurred in ten years:

Mileage of road.....	18.7
Mileage of second, etc., track.....	12.6
Mileage of yard and siding track....	42.8
Tractive power of locomotives.....	78.5
Capacity of freight cars.....	73.3

Even if the improvements indicated in the above presentation, and other improvements, represented precisely the best expenditure of the money possible, and railroad managers are certainly not infallible, the improvements were made almost entirely under stress and were intended to enable the railroad simply to handle the traffic offered. There has been no opportunity for the railroads deliberately to plan for the more distant future. A few roads may be happily situated, but the typical road has had to decide according to the exigencies of the case before it, whether it should spend money in one manner or in another.

Two ideas have been prevalent—the one, to hold down rates so that the railroads could just get along, or perhaps not even that; the other, to advance rates and leave it to the railroads. The one idea is as bad as the other. Both are so bad that no distinction in badness can be drawn.

One great reason why these two ideas prevail in their respective quarters is that each gives encouragement to the other. The fact that if increased revenues were given to the railroads they would be practically answerable to no one for the manner in which they spent the extra money encourages those who wish to hold the railroads down in the matter of rates. The fact that practically the whole spirit of the past few years has been to hold the railroads down encourages the railroads to desire a free hand in spending money so that they can put it to the best use according to the exigencies of their own case as they see it. The railroads have contended that year by year they were being forced into a more and more uncomfortable position, that their future was being made darker and darker. Were a liberal spirit shown in the matter of permitting rate advances, the railroad owners might conclude that the change was perhaps only temporary and might therefore

use the increased funds to increase dividends and unload their shares upon somebody else, and there you are!

For the development of the country and for the conservation of the existing industries, what is needed as much as rate regulation is needed is a comprehensive system whereby the growth of rail transportation facilities shall be at one and the same time both energetically encouraged and at the same time strictly regulated. The railroads that need to grow, for the good of the industries they serve and for their own good, should be compelled to grow, being given the facilities for doing so, and the manner of their growth should be regulated and controlled by the best talent that can be commanded. The establishment of such a system would be a tremendous work, but it is a work that needs to be done and to be done promptly. No such time should be allowed to elapse as was involved in the getting into real working order of the Interstate Commerce Commission as a rate controlling power.

Canada's Manufacturing Progress

The Dominion of Canada has shown itself capable of magnificent achievements in the burden which it has been bearing as a part of Great Britain, since the outbreak of the European war. Canada had previously been making excellent progress in developing its manufacturing industries, but its standing in that respect had hardly been appreciated because of the overshadowing influence of such a highly developed manufacturing country as the United States. If Canada were located in some other part of the world, its progress would have attracted much greater attention. The exigency of the European war, however, has thrown so much responsibility on the Dominion that the manner in which it has arisen to meet the emergency is worthy of admiration.

Statistics of the census of Canadian manufactures, taken in 1916 and covering the calendar year 1915, have just been published. They show that the number of manufacturing establishments in the Dominion increased in the decade ended with 1915 from 15,796 to 21,291. The total capital, including land, buildings, machinery, material and stock on hand and operating capital, owned or borrowed, advanced from \$846,585,023 to \$1,984,991,427, or 134.47 per cent. The total annual wages increased from \$134,375,925 to \$237,508,800, or 69.31 per cent, and salaries from \$30,724,086 to \$60,134,700, or 95.75 per cent. The value of manufactured products in 1915 was \$1,393,516,953, an increase of \$674,164,350, or 93.85 per cent. That the production in 1915 was not excessively swollen by the manufacture of goods for war purposes is shown by the statement that the total value of such products actually completed and delivered in 1915 amounted to \$130,166,307, which may, however, be increased by several millions in the final returns. The figures just given rival in percentage the industrial expansion of the United States in the same period. The earlier part of the decade showed expansion chiefly in the Eastern provinces, but the later years covered a time of remarkable activity

in the West. There are now approximately 1000 establishments in the Dominion turning out iron and steel products, covering nearly everything in these lines, and the capital invested in such establishments is placed between \$150,000,000 and \$200,000,000. Upward of 600 foundries are located in Canada, the greater number of which are in Ontario, Quebec and the Maritime provinces.

The Canadian iron and steel industry has received a great stimulus by the war orders placed for the manufacture of munitions. The total British orders placed in Canada for high explosives and shells have now exceeded over \$500,000,000. Besides these, large orders have been placed on Russian account. It is stated that over 600 establishments in the Dominion are now working on munitions. It is announced by the Minister of Finance that orders for munitions to be placed in Canada this year will also amount to \$500,000,000. So large a volume of business will necessarily keep many of the industrial plants of the Dominion running at full capacity for many months.

Canada has done well financially. At the outbreak of the war in 1914 the per capita debt was possibly one of the smallest in the world among civilized nations, while the savings of the people in public banks averaged about \$100 per head. Prior to 1914 Canada had loaned outside the Dominion, through its chartered banks, about \$200,000,000, of which \$140,000,000 was in call loans and nearly \$20,000,000 in current loans. Up to the present the total credits on munitions account granted to British authorities by the Dominion Government and the chartered banks of Canada amount to approximately \$250,000,000, of which \$175,000,000 has already been advanced.

It is interesting to note that Canada has embarked in the building of ocean-going steel vessels. In addition to the building of ships for British or Canadian owners, the government has granted permission for the export of ships from the Dominion to be constructed at shipyards at various points as follows: Vancouver, B. C., seven large steel cargo vessels; at Port Arthur, Ont., three full canal size steel cargo vessels; at Toronto, six steel cargo vessels, of which two are full canal size; at Montreal, two steel cargo vessels, at New Glasgow, N. S., three steel cargo vessels. They run from 3000 to 8000 tons each. One of the conditions on which permits were given to construct these vessels was that during the war they should not engage in any enemy trade, and another was that no demand should be made on Great Britain for materials, machinery or labor to build them.

The Department of Mines of Canada estimated the production of pig iron in Canada in 1916 to have been 1,171,727 net tons and the production of steel ingots and castings to have been 1,454,124 net tons. These figures, especially the figures for steel production, will be increased in 1916 by the additional output of establishments now in the course of construction. The energy which is being thrown into this branch of the trade is indicated by the announcement made in THE IRON AGE of last week that the Imperial Munitions Commission will install 10 6-ton Heroult electric furnaces in a new plant at Toronto to be used for making war material. While much of the equipment now being

used in Canada for munitions purposes may not be adapted to ordinary uses, it is to be expected that a very large part of it will eventually be turned over to the manufacture of products for general consumption. Undoubtedly the stimulus given to Canada's industrial growth by the war will have its influence in the coming years.

CORRESPONDENCE

Co-operation in Munition Manufacturing

To the Editor: Now that the rush of war orders has subsided and such contracts as are in order are running along quietly instead of at fever heat, a few of us are trying to balance what we have learned with what we have made—or lost.

Probably never before was there placed in the hands of the American manufacturer drawings which were so deceptive and which, upon careful scrutiny, disclosed so many irregularities. On the primer body, which fell to our lot, for instance, the dimensions had not been considered in relation to each other; consequently, conforming to the limits of one gage inevitably resulted in failure to meet the requirements of another. In fact, it was a case of working from a point not established. We have not yet been able to figure out how the engineers in charge of similar work in their own country could determine a sequence of operations which would eliminate this working in the dark.

Whether these inaccuracies were overlooked by our engineers, or whether they had no choice but to follow the foreign drawings literally, we cannot say, but the result was the same to the manufacturer. Just what the result was to many of the sub-contractors especially was evidenced by the letters which were sent out offering quantities of raw material at the market price or better. This stock was easily recognizable to those who were handling munition orders.

Considerable of the loss could have been prevented and these discouraged manufacturers persuaded to fulfill their contracts if the designers and those who prepared the specifications had known something of economical manufacturing methods. But perfection was demanded without regard to its being necessary to the functioning of the article, whereas estimates had been furnished in good faith on the assumption that the various articles were just a little finer than the ordinary commercial propositions. Consequently, the unforeseen exactions of the foreign inspector rendered the contracts so unprofitable that some concerns considered the abrogating of their contracts as the smaller financial loss.

One technical paper in discussing difficulties encountered in the manufacture of high explosive shells makes the following pertinent remark: "There can be no better form of preparedness than that which will eliminate useless expenditure of time, money and material and enable a large supply to be made at short notice."

It has been suggested by some one that it would be a wise thing for this Government to place small orders for munition parts with manufacturers so that the familiarity gained in the making of these parts would be of great service if the emergency ever arose which would demand the entire capacity of their plants for this purpose. It might be just as wise, or still wiser, if the army and navy engineers were right now to confer with the manufacturers with a view to accomplishing the result suggested above. An exposition on the part of the engineers as to how work is performed in the arsenals, together with a presentation of their available machinery by the various manufacturers, would lead to a very definite understanding as to just what items of our specifications are vital and what are optional and to the adapting of the machines to this end.

H. M.

FRENCH AFTER-WAR INDUSTRY

First Instalment of Report of American Commission to France

The American Industrial Commission to France has made public the first instalment of an extensive report it is to make to the American Manufacturers' Export Association. It deals with the probable condition which will at the close of the war confront the industries of France. The American Industrial Commission was invited to France by the French Trade Commission, which visited this country in 1915, backed by the Prime Minister and the ministers of Finance and Commerce. The party consisted of 15 American business men, under the presidency of W. W. Nichols, assistant chairman of the Allis-Chalmers Mfg. Company, of New York. The report says, in part:

"Even at this time, with the war raging, it was found that there is much reconstruction and new building ready to be undertaken. When peace comes, the amount of construction of industrial plants generally will be large. This applies both to France and Belgium. In France alone, along the battle front, more than 400 factories have been destroyed, and within the invaded region it is said that the plants have been denuded of machinery, tools, raw materials, building equipment and everything else of value.

"Since the war a number of companies in the North, unable to operate their mills, have started new plants in other sections of France, frequently so located that they will ultimately benefit from the exceptionally favorable water power in the Vosges and the Alpine regions. It is likely that an industrial survey will be made to locate the plants where they can operate at the best advantage. The importance of keeping industries upon which the country may depend for her safety in time of war away from the frontier regions will be borne in mind. New plants, up to date in every particular, are arising in sections in which industry has been, heretofore, hardly found.

"Our curiosity was aroused in St. Etienne, Lyons and other towns by some works which struck us as being almost typically American; in every instance we discovered that the companies operating them owned plants in the United States. We often heard the hope expressed that—after the war—American manufacturers and American capital would co-operate with French interests and erect new plants in France. There is disclosed here a large field for American enterprise which we think is well worthy of study.

"Most of the merchandise shipped from France to America consists either of luxuries or high-class necessities in which purchasers desire artistic design and a certain luxury of finish. The factories making such merchandise in most cases were not equipped for manufacturing war material, and the government aimed to keep such industries alive in order to export their products to pay for at least part of the enormous purchases made in America. In some instances plants continue to manufacture their usual product to a certain extent, part of the plant being devoted to the manufacture of war supplies.

"France is making a careful study of producing in a large industrial way goods that they have heretofore made only in a small way, such as toys and dolls, small ware, cutlery, fabric gloves, etc.

"France and America are not likely to be serious competitors in the world market because their strength lies in different directions. Broadly speaking, French industry has arisen to satisfy its own home wants, which are not large, but very diversified. France has adapted her industry to meet the varied wants of Europe and America, and this has qualified her in a peculiar degree to fill relatively small orders in special artistic goods with special imprints and in special styles with great profit to herself."

The American Drop Forge Association will hold its next general meeting in Cleveland, at the Hotel Statler, June 14, 15 and 16.

Taxing Industry to Make Up the Deficit

Earnings of Manufacturing Companies Again to Be Levied Upon—How "Capitalization" Is Used in Determining Excess

WASHINGTON, Jan. 23, 1917.—The industrial corporations of the country will be called upon to pay a special excise tax during the calendar year 1917 and thereafter on their net profits in excess of 8 per cent, if the bill now being framed by the Ways and Means Committee is enacted. The rate of this tax will be determined by caucus. The Secretary of the Treasury suggests an impost of 5 per cent, which he estimates would produce \$200,000,000, but the House committee does not believe the tax would be so productive and is disposed to fix the rate as high as 8 or even 10 per cent. The present plan is to assess this tax in addition to the taxes on corporate incomes and on the production of munitions, although certain members of the committee take the position that corporations paying the munitions tax should not be called upon to pay the special excise tax on profits and in support of this contention cite the fact that the munitions tax is itself designed as an impost on extraordinary gains.

The tentative draft of the new revenue bill prepared for the approval of the caucus of House Democrats stipulates that in calculating the profits tax in excess of 8 per cent on capitalization the term "capitalization" shall be understood to include all money paid in, actual property used or owned and all surplus and undivided profits. An exemption of \$5,000 of annual profits is allowed in all cases in addition to the basic 8 per cent of net earnings to which the tax does not apply. Profits derived from agriculture or from purely personal services, such as incomes of professional men, are exempt under the new law. Foreign corporations doing business in the United States will be required to pay the excess profits tax upon the business done here.

A Deficit of \$375,000,000

The task which the Ways and Means Committee has set itself is to meet a deficit which the Treasury Department estimates will occur during the fiscal year beginning July 1 next amounting to approximately \$375,000,000, and to provide a reasonable margin for increased expenditures already foreshadowed in the preparedness program and for river and harbor improvements, public buildings, etc. The department has furnished no details as to the basis upon which the prospective deficit is figured, but it is understood that it assumes that little or no tax will be collected from munition makers during the calendar year 1918, it being taken for granted that the European war will be brought to a close within the next twelve or fifteen months.

As a preliminary step to the framing of a revenue bill, the Ways and Means and Finance Committees recently requested the Secretary of the Treasury to transmit suggestions for increased taxes together with estimates of the amounts to be derived from each source. In response the department has forwarded to the committees a list embracing some thirty items and including the following: A tax of 5 per cent on "business profits" in excess of a dividend yield of 8 per cent, \$200,000,000; an output tax on pig iron, copper, aluminum and petroleum (rates not given), \$81,000,000; \$1 per horsepower on internal combustion engines, \$20,000,000; restoration of abandoned stamp taxes, \$49,000,000; increase in inheritance taxes, \$22,000,000; increase of 15 cents per gallon on distilled spirits,

\$50,000,000; increase of 25 cents a barrel on beer, \$14,500,000; a tax of 5 cents per gallon on "soft drinks" and mineral waters, \$42,000,000; additional taxes on cigars and tobacco, \$27,000,000; 1 cent per foot on motion picture reels, \$5,000,000; 1 cent per pound on glucose, \$15,000,000; a 10 per cent tax on candy, \$2,000,000; taxes on advertising bill-boards and street car cards, \$2,500,000; a 1 per cent tax on phonograph records, \$500,000, and the following import duties: 10 per cent on copper, \$4,500,000; 10 per cent on lumber, \$2,000,000; 3 cents per pound on coffee, \$12,000,000; 10 cents per pound on tea, \$10,000,000; 10 per cent ad valorem on cocoa, \$3,000,000; 10 per cent on crude rubber, \$15,000,000; 10 per cent on raw silk, \$12,000,000; 10 per cent on raw wool, \$11,000,000; 10 per cent on manufactured wool, \$2,000,000; 5 per cent on cotton manufactures, \$4,000,000, and 10 per cent on bananas, \$1,500,000.

The Program to Be Opposed

With a few exceptions this list has not appealed strongly to the Congressional leaders. The stamp taxes have been tried and discarded. The proposed direct internal revenue taxes on pig iron, copper, aluminum and petroleum and on internal combustion engines were discussed at the last session and were abandoned as impracticable, unjust, and likely to prove exceedingly unpopular. The present tax on distilled spirits is believed to be above the revenue point which means that any increase in rate would actually reduce the total collections thereunder. The suggested taxes on tea, coffee, cocoa, bananas, etc., are diametrically opposed to the Democratic principle of a "free breakfast table," while the proposed duties on rubber, wool, silk and other crude products are equally repugnant to the principle of free raw materials upon which all Democratic tariff legislation has been framed for many years.

After careful consideration the Ways and Means leaders have reached a tentative decision to limit the revenue measure to four items: first, the authorization of the sale of approximately \$250,000,000 Panama Canal bonds to reimburse the treasury for expenditures on account of the Mexican border mobilization, the Alaskan railroad, the projected armor plate works and the \$50,000,000 appropriation for the purchase or construction of cargo vessels by the new shipping board; second, a 50 per cent increase in the federal inheritance taxes; third, a tax of 8 or 10 per cent upon the net profits of individuals and corporations carrying on business for gain, and fourth, the authorization of the issuance of 3 per cent, ten-year treasury notes up to a maximum of \$300,000,000 in the discretion of the Secretary of the Treasury. It is assumed that if the first three items above mentioned produce sufficient revenue to avoid a deficit in the fiscal year 1918 the issuance of the short-time treasury notes will be deferred and possibly entirely obviated. The plan of the House leaders is to bring this bill out of committee before the end of the present month and to pass it before adjournment. That it can be put through the House is altogether probable, but the Senate is almost certain to amend its provisions in important particulars.

The minority members of both houses will stubbornly resist the enactment of the projected revenue

measure and while their opposition in the House will be rendered ineffective by the drastic rules of that body, which permit the "railroading" of bills approved by a majority caucus, it will be practicable to force important concessions in the Senate and quite possible to kill the bill if the minority is willing to assume the responsibility of a filibuster. As the death of the bill would make an extra session of Congress a practical certainty, nothing would be gained by resorting to extreme measures; hence the bill is likely to be enacted after certain modifications have been secured.

A Plan for Higher Tariff Rates

The program in opposition to the majority's bill is foreshadowed in a resolution just introduced in the House by Representative Williams, of Ohio, directing the Ways and Means Committee to report a bill repealing the Underwood-Simmons tariff act and re-enacting the Payne-Aldrich law "with such alterations as conditions may warrant." The preamble to this resolution recites that the treasury is threatened with a constantly increasing deficit; that the existing tariff law has failed to raise sufficient revenue; that experience has proved that the levying and collecting of income taxes is the most expensive system in its administration, while the levying and collecting of customs duties is the least expensive of all systems of raising revenue; that the tariff commission authorized at the last session of Congress has not yet been appointed, and that it is evident "that the Government of the United States must prepare to meet a gigantic commercial struggle which now threatens and will involve our country seriously upon the close of the European war." It is understood that the minority members of the Ways and Means Committee will present a report endorsing the substance of the Williams resolution as a substitute for the majority's bill.

W. L. C.

Great Lakes Freight-Vessel Capacity

The carrying capacity on one trip of all the bulk freighters on the Great Lakes increased only 32,266 gross tons in 1916, according to figures compiled by the *Marine Review*. The capacity on Jan. 1 was 3,109,585 gross tons. The greatest carrying capacity was on Jan. 1, 1912, when it reached 3,135,953 gross tons for one trip. It is stated that the total number of bulk freighters is less now than at any time since Jan. 1, 1906. The number is 540, as compared with 546 a year ago. The greatest number was 592 on Jan. 1, 1911. The decline in the number of vessels has been accompanied by an increase in the capacity of the fleet due to the building of larger boats. Seven bulk freighters were built for the Lake trade in 1916, with a carrying capacity of 82,000 tons, but offsetting this increase 13 boats, with a carrying capacity of 45,734 gross tons, were lost or sold for the ocean trade.

The Purchasing Agents Association of Rochester, Rochester, N. Y., has decided to permit representatives of manufacturers to come before its meetings and address its members, with the understanding that the privilege carried with it no permission to solicit orders at such meeting. The membership of the association is composed not only of purchasing agents but superintendents, production managers and others having authority to specify and buy raw materials, etc., and only those who have such authority and who are in no way interested in the resale of the goods they buy are eligible. It is believed the members may derive a great deal of benefit by devoting a portion of their meetings to the study of some device, equipment, machine or other material. Meetings are held on the fourth Friday of each month. Communications relative to program appointments should be addressed to E. A. Scheibe, Bausch & Lomb Optical Company, Rochester, N. Y.

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The Babcock & Wilcox Company, New York City, has adopted the mechanical soot blower built by the Diamond Power Specialty Company, Detroit, Mich., as standard equipment for the boilers which it builds. The blower is built for all makes of water and fire tube boilers and in December, 1916, orders were received to equip 122,200 hp. of boilers with these blowers.

Recovery of Benzol from Coke-Oven Gas

(Continued from page 263)

which give better fractionations than are possible in smaller apparatus. The continuous type of stills has not been found satisfactory in this work. The crude still does not require the elaborate dephlegmator that is necessary on the final rectifying stills. The heating is accomplished by means of internal steam coils and a direct steam spray. The benzol and toluol are principally distilled off by indirect heat, using the steam coils, and the higher boiling constituents, xylo, solvent naphtha, etc., are then distilled over by introducing steam directly into the still.

The Average Yields

After the benzol, toluol, xylo and solvent naphtha have distilled off, a certain amount of wash oil containing naphthalene remains in the still tank. The presence of wash oil in the light oil is due not only to mechanical trapping of the heavy oil during the distillation, but also to the actual distillation of some of its original constituents by agency of the direct steam used. The products recovered from 1000 gal. of light oil vary, according to the kind of coal coked, the regulation of the ovens, and the method of operation of the light oil plant. In one plant that may be taken as fairly typical of a well-operated system the yields average about as follows from 1000 gal. crude light oil:

680 gal. crude benzol.
140 gal. crude toluol.
50 gal. crude xylo.
55 gal. solvent-naphtha.
75 gal. wash oil residue with naphthalene.

The wash oil remaining in the still is drained into cooling pan M, where it is cooled in the air to crystallize out the naphthalene. The wash oil is drained away from the latter into tank N, and then is returned to the main circulating tank D. In large plants where the amount of naphthalene is great a centrifugal dryer is employed for the purpose of separating the small amount of oil remaining in the naphthalene, and also for reclaiming the naphthalene from the separating sump at the foot of the gas cooler. The crude naphthalene so obtained can be sold as such, or may be put into the tar in the coke plant.

The products obtained from the crude still will satisfy many commercial purposes in normal times. However, at present the demands of chemical manufacturers for benzol and toluol of a high degree of purity have made it advisable to accomplish the complete process of purification at the coke plant to serve this important part of the trade. For this purification the crude benzols are first washed with sulphuric acid and then with caustic soda and water. This operation is accomplished in agitator O, which is a large lead-lined vessel with an efficient mechanical mixing device for bringing the acid and benzol into intimate contact. The acid is commercial concentrated sulphuric acid (66 deg. Be). The quantity used is accurately measured from the meter tank p. The caustic soda solution is prepared in the tank Q and measured in the meter tank p.

The acid has the effect of reacting with, and to a large extent polymerizing most of, the impurities which consist of various olefines and substances of similar character, together with certain phenoloid bodies. This results in the formation of resinous substances of very high boiling point, part of which are insoluble in the benzols and settle out with the acid in the bottom of the agitator, while part go into solution, giving the benzol a dark brown or a reddish color. The acid sludge is drawn off and treated as will be described later. The caustic soda neutralizes any traces of acid which may remain in the agitator and effect the removal of some of the phenoloid bodies. After the soda wash the benzol has a lighter brown color, but always requires distillation. The washed benzol is delivered from the agitator to the still R. This still is generally of the same capacity as the crude still, but is pro-

vided with a very efficient dephlegmator. Sometimes purified products of less exact boiling points are desired. In this case the washed benzols are distilled rapidly, simply to separate the benzol from the resinous materials in solution. The products so produced are termed "purified," e.g., 90 per cent purified benzol, 50 per cent pure benzol, etc., the nomenclature being based on the percentage in test distilling under 100 deg. C. The distillation for the preparation of pure products is conducted more slowly, the condensate being collected in receivers S and tested carefully before placing in the final storage tanks.

Improvements in Practice

Great improvement has been made in recent practice in the distillation of pure benzol and toluol. In a well-designed plant the cuts are remarkably clean and the percentage of intermediate fractions small. At one benzol plant pure benzene is regularly being produced of a grade such that less than 5 per cent distills below 80.1 deg. C. and 95 per cent distills within 0.3 deg. C. Pure toluene also is being made, of which less than 5 per cent distills below 110 deg. C. and 95 per cent within 0.5 deg. C. This extraordinary degree of purity is of great advantage to manufacturers of explosives and synthetic chemicals requiring the use of pure benzols. The ease with which these distillations can be effected, and the sharpness of the cuts obtained is very remarkable. Much of the secret of success lies in the correct design of the dephlegmator. The record of one plant shows the following average figures for the distillation of crude benzol, containing toluol:

	Per Cent
Pure benzene	85.3
Intermediates	3.4
Pure toluene	9.8
Residue	1.3
Loss	0.2

The residue is often allowed to go to waste, but may be mixed with the coke-oven tar without injury.

The water and caustic soda used in the agitator are drained to the sewer. The acid sludge drained from the agitator is delivered to a boiler T, in which it is treated with direct steam. This effects a separation of the resinous materials in the form of a heavy carbonaceous spongy deposit. An acid of about 40 deg. Be. is recovered and may be used on the coke plant for making ammonium sulphate. The boiler is covered during the operation of steaming and the escaping vapors are condensed in a cooler. Regarding other details, such as the arrangement of pumps, storage tanks and piping, the diagram is self explanatory.

The upkeep of a benzol plant costs remarkably little, and the labor required in operation is small. A complete plant handling 5000 gal. of light oil per 24 hr. is operated by five men on day turn and three men on night turn, with two chemists for control testing and three laborers on day turn only for loading shipments and for general utility purposes.

The apparatus that is subjected to the most severe conditions is the superheaters. Spare superheaters should always be provided and the apparatus arranged so as to be readily interchanged. All apparatus for heating and cooling the wash oil should be so arranged that each individual unit can be taken out easily without disturbing the other apparatus. All apparatus with the exception of that exposed to sulphuric acid is made of iron and steel, no special alloys being required. It is very essential that the utmost precaution be taken in the arrangement of the piping to obviate the possibility of accidental mixing of the different products.

Since benzol is a by-product of coke and gas making, those items in the cost of its production which are involved also in coke and gas production are not chargeable to the benzol. In other words, the cost of making coke-oven benzol includes only the cost of its extraction from the coke-oven gas, and that of its purification. This cost in the United States will vary according to

local conditions, but usually lies between 4 and 7 cents per gallon.

At the close of the European war, when prices again become normal, it will be possible with the large plant capacity then available to make a substantial profit from the production and sale of automobile benzol (90 per cent purified) at prices competing with those of gasoline. There are other large uses creating a demand for the various benzols, described in earlier paragraphs, and further uses will be developed as the supply of the material becomes greater.

Loss in Calorific Value of the Gas

The effect of the removal of benzol on the calorific value of the gas has been well worked out by J. W. Shaeffer, who recently published his results in an article read before the October, 1916, meeting of the American Gas Institute. The actual loss in the calorific value of the gas amounts to about 5.8 per cent, which is a figure representing the average practice of about 30 by-product coke plants. The figure agrees well with theoretical considerations. The result is that more debenzolized gas has to be used for accomplishing a given heating effect. Assuming that one ton of coal makes 11,000 cu. ft. of gas, a reduction of 5.8 per cent is equivalent to 638 cu ft. less gas. As boiler fuel this gas is worth about 6 cents per 1000 cu. ft., so that the reduction may be figured to cost about 3.83c. per ton of coal, i. e., about 8 per cent of the normal value (based on gasoline prices) of the total benzol recovered from a ton of coal.

American Locomotive Company's Half Year

The American Locomotive Company has issued the following statement of the result of its operations in the first half of the current fiscal year, namely, the six months ended Dec. 31, 1916, as compared with the corresponding period in 1915:

	1916	1915	Increase
Gross earnings.....	\$37,863,594	\$14,398,859	\$23,464,735
Manufacturing, maintenance and administrative expense and depreciation	32,326,743	11,413,702	20,913,041
	5,536,851	2,985,157	2,551,694
Interest, etc., on bonds of constituent companies, notes, etc.....	83,517	128,667	*45,150
Profit	5,453,334	2,856,490	2,596,844
Reserve for United States munitions and income taxes and Canadian war taxes for the calendar year 1916.....	1,822,500	28,750	1,793,750
Profit available for dividend	3,630,834	2,827,740	803,094
Dividends on preferred stock for six months..	875,000	875,000
Dividends on common stock for six months..	625,000	625,000
Surplus profit.....	\$2,130,834	\$1,952,740	\$178,094

*Decrease.

The company has on its books unfilled orders amounting to \$75,746,377.

The Colorado Fuel & Iron Company announces in its last Bulletin that an eye specialist and a dentist have been appointed to care for the eyes and teeth of the children of employees. There will be no extra charge to the employee above his regular medical fee, except when glasses are provided and these will be furnished at cost. Arrangements are being made with the boards of education to have the inspection work done during school hours. The dentist and oculist will visit each mine about twice a year. The Board of Education at Pueblo, with the co-operation of the Colorado Fuel & Iron Company, recently arranged to provide dental service in the first and second grades of the schools of that city, thus extending these benefits to the employees of the company's steel plant.

British Output of Shells and Guns

The enormous increase in the British output of munitions since the war began is indicated by the London *Iron and Coal Trades Review*. In artillery ammunition, taking as a basis the average weekly output from the beginning of the war up to July 1, 1915, the progress is shown by the following table, in which the basis is the performance on June 30, 1915:

	Av. per Week on June 30, 1915	Av. per Week for Year Ended June 30, 1916	Week Ended July 1, 1916	Week Ended Nov. 25, 1916
18-pounder	1	6.5	17.5	43
Field howitzers, 4.5 in.	1	8.0	27.0	46
Medium guns and howitzers	1	7.5	34.5	66
Heavy howitzers, above 6 in.	1	22.0	94.0	323

Shells completed or filled in the week Nov. 19 to 26, 1916, exceeded by about 30 per cent the stock of munitions held in reserve when the war began. The increase in gun production, dealt with in the same way, is as follows:

	First Year	Second Year	Aug. to Nov. 1916 (4 Months)
18-pounder	100	240	45
4.5-inch	100	654	104
Medium (50-pdr. and 6-in.)	100	1,848	1,200
Heavy, over 6-in.	100	623	363

The equipment of the British army in field pieces being approximately complete, the making of 18-pdr. guns was slackened in the last period. The average monthly output of guns of all caliber, comparing the first year with the second period, is shown as follows:

	Av. per Month, First year	Output in 5 Months Ended Dec. 2, 1916
18-pounder	100	138
Medium	100	4,100
Heavy	100	1,250

The 4.5-in. guns are not included, the supply being complete. In machine guns, if the total delivered to the army in the first year of the war be represented by 100, the total relatively at the end of the second year would be 1250 and by Dec. 2, 1916, 2000. Representing the weekly machine gun output in November, 1915, by 100, the corresponding figure for November, 1916, would be 410.

For every 100 rifles made per week in June, 1915, there were 160 made in June, 1916, and 173 in November, 1916, an increase being difficult to achieve. Those repaired and put back into service are about equal to half the output of new ones.

As to explosives, for every ton employed in September, 1914, there were 350 tons used in July, 1915, and from 11,000 to 12,000 tons in July, 1916. If the average amount of explosive used in charging shells in one week in June, 1916, be represented by 100, the increase for April, 1916, has been to 180; for July, to 590; for October, to 920, and for Nov. 19 to 25, to 1120.

American Machinery in Russia

In a recent issue of *Russia*, a monthly journal of Russian-American trade, attention is called to the fact that an important reason for Germany's predominance in the machinery trade in Russia is the speed with which defective parts could be replaced. As against days for filling such orders in Germany a good many weeks are required where they are sent to the United States. It is pointed out that American manufacturers will be obliged to stock Russian warehouses with spare parts and to equip repair shops for instant service. In addition, American firms must sell direct and not through German middlemen.

The third blast furnace of the Worth plant of the Midvale Steel & Ordnance Company at Coatesville, Pa., which has been under construction in the past year, will probably be ready to blow in by March 1.

SHELL AWARD TO HADFIELDS

Government Aids the Dumping of British Product —A Bill to Stop It

WASHINGTON, Jan. 23, 1917.—The controversy between the Secretary of the Navy and certain steel companies over the cost of war material to be furnished the Government has been brought to an acute crisis by the action of the Navy Department in awarding to the English concern, Hadfields, Ltd., a contract for 4500 14-in. armor piercing shells at a cost of \$356 each, to be delivered in 19 months, and 3000 16-in. shells at a cost of \$513 each, to be delivered in 16 months. The matter has attracted much attention in Congress, and has induced Representative Rodenberg of Illinois, a veteran member of the House, to present a resolution making it "unlawful for the head of any department of the Government of the United States to invite and accept bids from foreign manufacturers on contracts for supplies for the use of the Government of the United States."

Failures of American Shells

Secretary Daniels' published statements with regard to the relatively high bids of American manufacturers as compared with those submitted by Hadfields, Ltd., and the dates of delivery stipulated in the respective proposals, have not made much impression in Congress. Members and Senators understand the peculiar circumstances which enable Hadfields, Ltd., to "dump" a relatively small part of its product in the United States after having piled up a colossal reserve for the British navy, and do not regard the incident as in any way reflecting upon the patriotism or enterprise of American concerns. One feature of the Secretary's charges, however, has aroused much interest, and the American steel makers are expected to resent it vigorously and promptly. In a statement given out by the Secretary for publication yesterday he reviews the history of bids for large caliber shells during the past three years, and after quoting the prices at which contracts were placed with American manufacturers he declares that "with no spur of competition to drive them on they have failed to keep pace with the improvements in the quality of armor piercing shells being made abroad." Continuing he says:

Some American companies seem to think it was our duty to let them go ahead in the same old way, manufacturing shells inferior to the best rather than to expect them to improve their product. Of course, their pleas and even their thinly veiled threats to go out of the business if we did not concede this right to them were ignored.

I regret to say that these companies, apparently secure in the belief that we would have to take whatever kind of shells they manufactured anyway and at any price they saw fit to make, have not improved their projectiles to meet the real requirements. I would be most reluctant to publish these figures did I not believe that they are well-known abroad, and in view of this I feel no harm can be done in letting our own country know the facts. Out of 34 14-in. shells submitted by the Bethlehem Steel Company for test, three passed, a percentage of 8.8. The Crucible Steel Company managed to get 37.7 per cent of the sample shells submitted passed, and the Midvale, which apparently showed more enterprise and real desire to bring up the standard than others, 73 per cent, a most gratifying improvement over the others and which shows that our contention that American companies can produce good shells is well founded. Of the shells submitted by the Hadfields, Ltd., consisting of three sample shells and six additional test shells, not a single one failed to meet all the requirements.

Government Capacity for Projectiles

In this connection Secretary Daniels makes a statement with regard to the capacity of the proposed Government projectile factory which, inferentially, appears to apply also to the armor plate factory already appropriated for by Congress. Referring to the charge that the department proposes "to force private manufacturers out of business" he says that with an ever-increasing navy there will always be plenty of work for the private manufacturers "so long as they are willing to improve their product so as to keep abreast with foreign

governments and to quote a just and reasonable price for what they make." He adds that he never had in mind a Government projectile plant of greater capacity, working one shift of men, than one-third of the total amount required by the navy, thus leaving two-thirds of the Government's requirements to be met by private manufacturers.

There is much sentiment in Congress favorable to the passage of Representative Rodenberg's resolution forbidding the placing of contracts with foreign manufacturers for supplies for the use of the Government "whenever such supplies can be manufactured and furnished to the Government by American manufacturers," but it is doubtful if action on the measure can be had at the present session in view of the crowded docket and the fact that the present Congress will adjourn in less than six weeks. In the preamble to his resolution Mr. Rodenberg says that "it is an admitted fact that the rate of wages paid to employees in the manufacturing industries of the United States is from two to four times as high as is the rate of wages paid to employees in the manufacturing industries of England and other European countries," and that not less than 75 per cent of the price of any manufactured article represents the cost of the labor required to produce the article. This great disparity in the rate of wages paid to workmen in the United States and in foreign countries, and with it the fact that all articles for the use of the Government are admitted to our ports without the payment of any tariff duties, it is contended, "make it absolutely impossible for American manufacturers to compete successfully with foreign manufacturers in furnishing supplies for the use of the Government of the United States without destroying the present American wage scale."

The action of the Navy Department in awarding to Hadfields, Ltd., contracts for 7500 of the 15,300 14 and 16-in. shells included in the department's recent advertisement raises the interesting question as to how the 7800 remaining shells will be obtained. The English company was awarded the full quota included in its proposal, and a persistent rumor has been current here that the department is negotiating with a view to inducing Hadfields, Ltd., to provide the entire quantity. Inquiries regarding this phase of the subject are met by department officials with the evasive reply that "no statement can be made at this time with regard to the matter."

W. L. C.

Record Manganese Ore Output

The high grade manganese ore production in the United States in 1916 was about 27,000 gross tons, according to preliminary estimates by D. F. Hewett of the U. S. Geological Survey. This is the largest since 1888, and nearly three times that of 1915, which was 9709 tons. The total does not include manganiferous iron ores. California leads the list of seven states producing last year, Virginia ranking fifth, with Arkansas, Arizona and Georgia, second, third and fourth. The activity in California was due largely to the market provided by the Noble Electric Steel Company, Heroult, Cal., which has been making ferromanganese in an electric furnace. The production of high grade ore suitable for use in dry batteries will probably exceed 2500 tons in 1916 or five times that of the 1915 output.

The report states that the price of high grade ores rose from a maximum of \$22.50 for 50 per cent ore in 1915 to \$32.50 in March, 1916. In the last month of the year sales as high as \$39 for 50 per cent Indian ore were reported.

Of the 495,299 tons of manganese ore imported in the first 10 months of 1916 Brazil furnished 410,177 tons. The probability is that the entire imports for 1916 will be almost double those for 1915, which were 320,778 tons. There is a prospect, the Survey report says, that several Western mines in the United States may be able to ship high grade ores to Eastern markets even when prices recede to the level of years prior to 1914.

The next meeting of the National Safety Council will be held in New York City, Oct. 16 to 20.

AFTER-WAR SHOP CONDITIONS

Metal Trades Employers Discuss the Tariff and Foreign Competition

Under the direction of the Worcester Branch of the National Metal Trades Association and the Employers' Association of Worcester County, an industrial conservation convention was held at the Bancroft Hotel, Worcester, Mass., Jan. 19. There were three sessions.

At the morning session, John W. Harrington, president of the Employers' Association of Worcester County, presided. Following a demonstration lecture, "The Value of Moving Pictures in Industry," by E. P. Cornell of Boston, Herbert E. Jennison, president of the Fitchburg Employers' Association, led a discussion on "Why We Stand for the Open Shop." The speakers included Clarence E. Whitney, Hartford; Frederick Fosdick, Fitchburg; George I. Alden, Worcester; E. J. Cross, Worcester; Robert Porteous, Hartford; Charles G. Phelps and Wilson H. Lee, New Haven. Thomas J. Kelley, secretary of the Employers' Association of Hartford County, sounded the keynote of most of the talks when he said: "The open shop stands as an agency for the industrial stability of the country. Show me a closed-shop town and I will show you a decadent town. Show me an open-shop town and you will find a thriving, pulsating community."

Labor Conditions After the War

The first discussion of the afternoon was on the subject "What We May Expect? How Can We Maintain the Present Payroll after the War without a Protective Tariff?" Albert E. Newton, Reed-Prentice Company, Worcester, presided. This was thoroughly debated and there was much interest in the addresses. R. H. Rice, General Electric Company, who is president of the Associated Industries of Massachusetts, said:

One or two indications of the utmost significance are fresh in our minds to-day. The first is the tremendous slump in security values which occurred at the first whisper of peace. Is this not the best possible indication of the opinion of investment buyers as to what will happen to business at the end of the war?

The second instance is the recent underbidding of American manufacturers by the English corporation, Hadfields, Ltd., for furnishing shells to the United States Government. In time of war, when every nerve is supposed to be straining in the Allied countries to provide enough munitions for their own use, an English concern finds time and facilities to take an order away from our own manufacturers and at a considerably lower price. What better indication can we have of the course of events succeeding the declaration of peace?

"How may we maintain our present payrolls after the war?" My answer is that we cannot hope to do so. To meet foreign competition, either at home or abroad, we must have lower prices; to keep our factories going at all we will have to buy everything entering into the cost of our products at lower prices; to maintain any payrolls at all we must not only pay less for material, but less for labor.

We only have to take up the files of the daily newspapers of 1913 to read what will happen to us under these conditions. At that time our factories were only running part time or not at all; our forces of operatives from necessity had to be reduced or cut off altogether. There were legions of unemployed and bread lines in every city. Conditions will be different after the war, because we have greatly expanded our manufacturing facilities, and these larger factories and more extensive equipment will therefore be emptier than the smaller factories of 1913.

One remedy proposed is a high tariff wall. This will be inadequate, because our manufacturing facilities will be far too great to be fully occupied by American business solely, and we shall need considerable foreign markets. The vital necessities for the present, to provide for a reasonable future, are:

Legislation fostering business instead of more legislation oppressing it.

Legislation fostering export trade instead of legislation hampering it.

Legislation permitting American manufacturers to combine their efforts against the foreign combinations of manufacturers already formed.

Recognition of the obvious and essential fact that the prosperity of the nation depends absolutely upon the prosperity of its industries.

Co-operation of all elements of our community and, most

important, co-operation of all elements of industry, to the end of producing the best possible goods at the lowest possible cost; and the marketing of these goods to the fullest world-wide extent, and in the greatest possible volume.

The tendency of events at this time is precisely opposite to the requirements set forth. It seems to have been discovered that by taxing the industries, funds can be supplied for any and every purpose. It seems to be the theory that no restrictions, however unusual, can dam the stream of prosperity or cause the millwheels to cease to turn.

At the moment this may be the case. At the moment it may be possible to defray all the vexatious tax bills and increased compensation charges imposed on us by public action, and to pay bonuses to employees. But the embalming of these things in legislation can only have a disastrous effect after the war.

Europe's Increased Efficiency

Hon. Channing Smith, a member of the Governor's Council of Massachusetts, said in part:

The war, instead of bringing impairment of industrial efficiency in any of the warring nations, has greatly increased their productive power. No hostile shot has demolished a German mill or factory. Russia's easy-going methods have given way to an industrial energy that marks a new era in Russian development. Japan has become a skilled and efficient producer of war munitions and peaceful products, and from there we must look for serious low labor cost competition. Notwithstanding the loss of many expert mechanics, the efficiency of the French industries has been increased over 300 per cent.

A new spirit has taken possession of the industrial and agricultural workers of England. Work that used to be performed by three skilled mechanics is now done by one mechanic and three women, and this group of four is turning out in 20 minutes what it took the former group of three an hour and a half to do. Lloyd George is authority for the statement that the efficiency of the British working people has been increased eight-fold. Canada's record is notable. At the beginning of the war Canada's production of shells was confined to the Quebec Arsenal. To-day Canada is shipping 3,000,000 loaded shells a month to Great Britain, besides having sent 1,500,000 shells to Russia, with 50,000 shells additional going to that country each week.

The astounding record of industrial efficiency which has been made by the warring nations should convey to us a lesson and a warning. Competition for the world's trade will be far keener in the future than it has ever been.

The present artificial wages in many of our industries cannot be maintained after the war, tariff or no tariff. Coupled with the war wages go the extra load of continued reduction in hours of labor, increased taxes of every name and nature, and the threatened cost of social insurance which includes old age pensions, health insurance and insurance against unemployment, which we all know, when once begun, will constantly grow in their allowance in this land of generosity with other people's money, and industry will bear a large share of the burden before you get through experimenting with theory.

About 500 people sat at the tables during the banquet which was the feature of the evening session, presided over by Jerome R. George, Morgan Construction Company, Worcester. W. H. Van Dervoort, president of the National Metal Trades Association, outlined the policy of that organization and told of the success of its work during the two strenuous years just passed and its preparations for the year to come. James A. Emery, Washington, D. C., was the chief speaker of the evening and gave an inspiring address on the necessity of the manufacturer taking an interest in legislation, both State and national.

The money paid as grants by 256 steel plants employing over 500,000 workmen reached \$23,000,000 in the second year of the war in Germany, according to statistics of the Association of Iron and Steel Producers. The money was distributed among an average of 125,000 families. The total for the two years of the war is stated to exceed \$35,000,000.

It has already been stated that the Estate of Joseph Wharton did not include in the recent sale of the Wharton Steel Company to J. L. Replogle and others the Wharton Coal & Coke Company's property in Indiana County, Pa. The estate also retained the Rossie Iron Ore Company's property at Spragueville, N. Y.

Iron and Steel Markets

EXPORT RAIL DEMAND

Foreign Inquiry Persistently Heavy

Shell Steel Needs Still Unsatisfied—100,000 Tons of Bessemer Iron Wanted

January has developed no signs of a change to easier conditions in the steel trade. After all the peace moves, it is apparent that American steel manufacturers will be beset for months with more business, export and domestic, than they can handle. The past week has emphasized the tightening of the situation.

Predictions lately made of a lessened export movement in 1917 are to be taken in the light of larger expectations of an expanding domestic demand which the mills cannot put aside.

More has come out concerning shell steel bought for the Allies for the second half. Four companies took on large amounts, and the buyers want much more, which at present the mills could not safely agree to deliver. Canada in particular is now trying to buy such steel.

In rails, rolling stock and plates there is a flood of foreign inquiry. In addition to the large rail tonnages lately offered from England, Russia and France, there are now negotiations on behalf of many small countries. For Spain 25,000 tons is wanted; for Cuba and Porto Rico, 3000 to 5000 tons; for a western European state, 20,000 to 40,000 tons; for the Orient, 2000 tons. France would take 40,000 cars, but 20,000 may be the total purchase, as 100,000 tons of steel is sought on this account by car works. Thus far about 5000 of these smaller type cars have been placed.

Highly significant is the report, though with little detail, that Great Britain is seeking to buy vessels here. Another item in the new demand from abroad is a large tin-plate tonnage for China, put at more than 400,000 boxes.

Billets at \$65 in the Central West are a gage of continued scarcity of steel, as is also a sale of 10,000 tons by a Pennsylvania mill at \$62.50 for shipment to Italy. More rails for export have sold at \$60.

Again the railroad situation at Pittsburgh is reported worse. With the industry now seriously deranged by crippled motive power and lack of cars, the coming on of severe winter would be nothing short of calamity. To-day shipments and new orders about balance. Until winter passes the rate of pig iron production will hardly get above 39,000,000 tons a year, against 41,700,000 tons at the high point in October.

In the Eastern plate market inquiries have appeared for 12,000 tons for six vessels on which seaboard yards are figuring. Unsatisfied plate demand from Japan is put at 20,000 tons. A Great Lakes yard has bought 3500 tons of plates and shapes for an oil steamer, and at Erie, Pa., 4800 tons of plates are wanted for tank cars.

As to the attitude of domestic buyers, our Chicago report notes that there is great caution in placing orders for the second half of the year,

though it is recognized that the momentum of business is unchecked.

The Steel Corporation advanced its contract prices for shapes and plates to 3.25c. and 3.75c., Pittsburgh, respectively, effective Jan. 23. Bars remain at 3c.

Rail sales include 10,000 tons for Alaska, 4000 tons for South Africa and 5000 tons for the Michigan Central. The Pennsylvania inquiry for 205,000 tons for 1918 is reported withdrawn and it is understood some of the Pennsylvania rails bought for 1917 are not to be shipped until next year.

Structural contracts still reflect industrial expansion. At Chicago 4000 tons is wanted for the Mark Mfg. Company's steel works, and at Pittsburgh 3000 tons was taken for the Whitaker-Glessner Company's new mills. The 7800 tons for Westinghouse construction at Essington will be followed in time by 20,000 tons more for that plant. The American Bridge Company will furnish 15,700 tons for the Livonia Avenue elevated extension in Brooklyn. Bids will soon be asked on 35,000 tons for two new subway and elevated projects in Greater New York.

J. P. Morgan & Co.'s new inquiry for 100,000 tons of Bessemer iron, presumably for France and Italy, has resulted in little business thus far. The buyer's price is \$35, but little iron is available and makers consider the upward movement to be unfinished. Some quiet inquiry for basic and Bessemer iron for the second half has come from domestic consumers, but they are not ready to pay \$30 and \$35 for delivery to the end of the year.

The Lake Superior ore movement this year, in the opinion of some Cleveland shippers, will not reach the 1917 total of 66,000,000 tons, in view of smaller stockpiles, the possibility of labor scarcity and the fact that a good many furnaces can run until well into the summer on 1916 ore. The poor condition of blast furnaces and the limitation of coke supply are other factors in ore consumption.

Pittsburgh

PITTSBURGH, PA., Jan. 23, 1917.

A flood in the Monongahela and Allegheny rivers has added to troubles of furnaces and mills in this district, but the water is now falling and the worst of the trouble is ended. Many plants along these rivers were idle from 24 to 48 hr., including a number of blast furnaces. The railroad situation is worse, embargoes being in force on nearly all the lines running out of Pittsburgh, and it is hard to estimate the quantity of raw and finished steel, pig iron and coke held up for want of cars. Railroads say they are doing all in their power and are acting with the Interstate Commerce Commission to try to relieve the situation. Many manufacturers are not pushing sales but are giving their entire efforts to getting material moved. There were no price advances the past week, and for the first time in many months mills are shipping out, in spite of the bad car situation, about the same amount they are entering on their books. Consumers are not showing much disposition to contract ahead, as they cannot get material on new orders before the second quarter at least, and on some lines, notably plates, before third

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Jan. 24, 1917.	Jan. 17, 1917.	Dec. 27, 1916.	Jan. 26, 1916.
Pig Iron, Per Gross Ton:				
No. 2X, Philadelphia...	\$30.50	\$30.00	\$29.50	\$20.00
No. 2, Valley furnace...	31.00	31.00	31.00	18.50
No. 2 Southern, Cin'tl...	25.90	25.90	25.90	17.90
No. 2, Birmingham, Ala...	23.00	23.00	23.00	15.00
No. 2, furnace, Chicago*	30.00	30.00	30.00	18.50
Basic, del'd, eastern Pa...	30.00	30.00	30.00	19.50
Basic, Valley furnace...	30.00	20.00	30.00	17.75
Bessemer, Pittsburgh...	35.95	35.95	35.95	21.45
Malleable Bess. Ch'go*	31.00	31.00	30.00	19.00
Gray forge, Pittsburgh...	29.95	29.95	29.95	18.45
L. S. charcoal, Chicago...	31.75	31.75	31.75	19.75

Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh	65.00	65.00	60.00	32.00
O.-h. billets, Pittsburgh	65.00	65.00	60.00	33.00
O.-h. sheet bars, P'gh...	65.00	65.00	60.00	35.00
Forging billets, base, P'gh	80.00	80.00	80.00	55.00
O.-h. billets, Phila.....	60.00	60.00	60.00	42.00
Wire rods, Pittsburgh...	75.00	75.00	70.00	45.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.159	3.159	3.159	2.259
Iron bars, Pittsburgh...	3.25	3.25	3.25	2.00
Iron bars, Chicago.....	3.00	3.00	3.00	1.90
Steel bars, Pittsburgh...	3.25	3.25	3.00	2.10
Steel bars, New York...	3.419	3.419	3.169	2.269
Tank plates, Pittsburgh	4.50	4.50	4.25	2.25
Tank plates, New York...	4.669	4.669	4.419	2.519
Beams, etc., Pittsburgh...	3.25	3.25	3.25	1.90
Beams, etc., New York...	3.419	3.419	3.419	2.069
Skelp, grooved steel, P'gh	2.85	2.85	2.85	1.90
Skelp, sheared steel, P'gh	3.00	3.00	3.00	2.00
Steel hoops, Pittsburgh...	3.25	3.25	3.25	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Jan. 24, 1917.	Jan. 17, 1917.	Dec. 27, 1916.	Jan. 26, 1916.
Per Lb. to Large Buyers:				
Sheets, black, No. 28, P'gh	4.50	4.50	4.50	2.60
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	4.75
Wire nails, Pittsburgh...	3.00	3.00	3.00	2.20
Cut nails, Pittsburgh...	2.95	2.95	2.95	2.10
Fence wire, base, P'gh...	2.95	2.95	2.95	2.05
Barb wire, galv., P'gh...	3.85	3.85	3.85	3.05

Old Material, Per Gross Ton:

Iron rails, Chicago.....	\$27.00	\$27.00	\$27.00	\$17.50
Iron rails, Philadelphia...	28.00	28.00	28.00	19.50
Carwheels, Chicago.....	18.50	19.00	20.00	14.25
Carwheels, Philadelphia...	21.00	21.50	22.00	16.50
Heavy steel scrap, P'gh...	23.00	22.00	24.00	17.50
Heavy steel scrap, Phila...	21.00	22.00	23.00	16.50
Heavy steel scrap, Ch'go...	21.00	21.00	21.50	15.25
No. 1 cast, Pittsburgh...	19.00	19.50	21.00	15.75
No. 1 cast, Philadelphia...	20.00	20.00	21.00	17.00
No. 1 cast, Ch'go (net ton)	15.50	15.50	15.50	13.00
No. 1 RR. wrot, Phila...	26.00	27.00	27.00	22.00
No. 1 RR. wrot, Ch'go (net)	23.50	23.50	23.50	15.75

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$8.50	\$8.50	\$9.50	\$3.00
Furnace coke, future....	6.00	6.00	4.50	2.50
Foundry coke, prompt...	10.00	10.00	10.00	3.50
Foundry coke, future....	7.00	7.00	6.00	3.25

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	31.00	29.00	31.00	25.50
Electrolytic copper, N. Y.	31.00	29.00	31.00	25.37 1/2
Spelter, St. Louis.....	9.87 1/2	9.75	9.50	19.00
Spelter, New York.....	10.12 1/2	10.00	9.75	19.25
Lead, St. Louis.....	7.62 1/2	7.50	7.30	6.00
Lead, New York.....	7.75	7.65	7.50	6.10
Tin, New York.....	45.50	44.25	40.87 1/2	42.12 1/2
Antimony (Asiatic), N. Y.	15.00	14.25	14.00	42.00
Tin plate, 100-lb. box, P'gh	\$7.00	\$7.00	\$7.00	\$3.75

quarter; they also believe that prices will not be any higher than now when they need the material. The scarcity in semi-finished steel continues, but there is not much new buying.

Pig Iron.—An inquiry is in the market here from J. P. Morgan & Co. for 100,000 tons of Bessemer iron, presumably for France and Italy. Only a very small part of this quantity could possibly be picked up from Valley furnaces and it is said that \$35, Valley furnace, would readily be paid on any part. The only other active inquiry in pig iron is for foundry in small lots for prompt shipment. Foundries are not getting satisfactory shipments on iron already bought, and are trying to get small lots to help out. It is claimed there is some quiet inquiry for Bessemer and basic for last half, but consumers do not seem willing to consider \$30 for basic and \$35 for Bessemer for that delivery. The spread of \$5 between Bessemer and basic iron is abnormal, and will likely be adjusted when pig iron commences to move. Quotations are continued as follows: Standard Bessemer iron, \$35; basic, \$30 to \$31; gray forge, \$29; malleable Bessemer, \$30; and No. 2 foundry, \$31 to \$32; all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—There is not much business doing, partly for the reason that consumers are covered on regular contracts and also because little surplus steel is to be had. Sheet and tin-plate mills and other large consumers of semi-finished steel are not getting prompt shipments, due to the bad railroad situation, and occasionally as high as \$65 is offered for billets or sheet bars, Bessemer or open-hearth, for prompt delivery. Discarded shell steel is ruling at \$39 to \$42 per gross ton at mill. A sale of 4000 tons is reported at \$41 or less. We quote soft Bessemer and open-hearth billets and sheet bars at \$65 to \$70 per ton, maker's mill, Pittsburgh or Youngstown; forging billets, \$80 to \$85, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Structural Material.—The new inquiry is still quite heavy, and some fairly large jobs have been placed. The McClintic-Marshall Company has taken about 6000 tons for extensions to the steel plant and pipe mills being built by the Mark Mfg. Company of Chicago, and has also taken about 3000 tons for a new sheet-mill

building and extensions to present open-hearth buildings of the Whitaker-Glessner Company in the Wheeling district. The Blaw Steel Construction Company has taken about 300 tons for an extension to a steel building of the Knox Pressed & Welded Steel Company, Wheatland, Pa. Active inquiries in the market include upward of 4000 tons for a new union terminal passenger station at Richmond, Va., and also a bridge over the James River for the Atlantic Coast Line. The Pennsylvania Railroad has asked bids on about 3000 tons of steel for a bridge across the Allegheny River at Oil City, Pa. A new office building at Charleston, W. Va., will require about 500 tons. On structural steel shapes for delivery in second and third quarters one leading interest is quoting 3.10c. to 3.25c. at mill. The Carnegie Steel Company's price for indefinite delivery on structural shapes is 3c. at mill.

Ferroalloys.—New inquiry for 80 per cent ferromanganese is quite active, one consumer being reported in the market for 2000 tons for second and third quarter delivery. Prices on spiegeleisen have advanced sharply, and this material is scarce. We quote English 80 per cent ferromanganese at \$164, seaboard, with no guarantee as to deliveries. Domestic 80 per cent ferromanganese is quoted at \$170 to \$175 at furnace. Both stacks of the American Manganese Mfg. Company at Dunbar, Pa., are in operation. The supply of domestic 50 per cent ferrosilicon for prompt shipment is still very light, and it has sold at 6c. to 8c. per pound. We now quote 18 to 22 per cent spiegeleisen at \$60 to \$65, and 25 to 30 per cent at \$70 to \$80, delivered; 9 per cent ferrosilicon, \$39 to \$41; 10 per cent, \$40 to \$42; 11 per cent, \$41 to \$43; 12 per cent, \$42 to \$44; 13 per cent, \$43.50 to \$45.50; 14 per cent, \$45.50 to \$47.50; 15 per cent, \$47.50 to \$49.50, and 16 per cent, \$50 to \$52; 7 per cent silvery, \$29.50 to \$30; 8 per cent, \$30 to \$31; 9 per cent, \$30.50; 10 per cent, \$31; 11 per cent, \$32, and 12 per cent, \$33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district.

Plates.—The only item in the whole list of finished iron and steel on which premiums in prices are still being paid for fairly prompt shipment is plates. Any mill that can ship out 1/4-in. and heavier sheared plates

within 60 to 90 days can get 4.50c. at mill or more. New orders for steel cars in the past week were more plentiful. The Pressed Steel Car Company has taken 1500 steel gondolas for the Chicago, Burlington & Quincy and 35 steel subway cars for the Boston Elevated. The Standard Steel Car Company has taken 100 more steel gondolas for the Atlantic Coast Line, 500 automobile cars for the Illinois Central, 400 cars for the Java State Railways, and 400 rack, hopper and produce cars for the Maine Central. The price of the Carnegie Steel Company for $\frac{1}{4}$ -in. and heavier plates remains at 3.50c. for indefinite delivery, but mills that can ship in second and third quarters are quoting about 4.50c. to shipyards and steel-car companies. Small lots of plates for fairly prompt shipment are quoted at 5c. and higher, at mill.

Steel Rails.—Mills report they are sold up on standard sections for this year. The demand for light rails rolled from steel billets and also rerolled light rails is quite active from the coal-mining companies. We quote new light rails as follows: 25 to 45 lb., \$50; 16 to 20 lb., \$51; 12 and 14 lb., \$52; 8 and 10 lb., \$53, in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth, \$40, per gross ton, Pittsburgh.

Sheets.—Negotiations are on with the Ford Motor Company, Detroit, Mich., for its entire supply of sheets to cover the manufacture of 1,000,000 automobiles within the next year or 18 months. It is said deliveries on sheets, bars and other materials are to run over all of this year and through the first half of 1918, and the contracts are expected to be double the quantity they were last year. In previous years the company has divided its needs of sheets among four or five mills, and this policy will no doubt be followed now, but the larger part will go to the leading sheet interest. The new demand for sheets is heavy and great pressure is made on the mills to make deliveries. The car situation is bad and thousands of tons of sheets are piled in warehouses awaiting shipment. Prices are firm, with most consumers covered over the first half of this year. We quote blue annealed sheets, Nos. 3 to 8, at 4c. to 4.25c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.50c. to 5c.; No. 28 galvanized, 6.25c. to 7.50c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots, and the higher prices quoted are for reasonably prompt shipment.

Tin Plate.—Domestic demand is only fairly heavy, but export inquiry is active. One export inquiry is for upward of 50,000 boxes, and it is expected to be closed this week at about \$7.50 per base box at mill. Most leading consumers are covered over the second half of this year, the price to be fixed later. In view of recent developments in the steel trade it is now believed that the price of tin plate for second half will not be above \$7 per box, and perhaps not that high. On current orders for shipment from stock, prices range from \$7 to \$7.50 per base box at mill. We quote I. C.terne plate, 107 lb., at \$7.15 to \$7.65, and 200 lb. carrying 8-lb. coating, at \$11, the usual advances applying for heavier weights and coatings.

Shafting.—Most consumers have covered recently for their needs in the second quarter, but as yet none of the mills has opened its books for the second half. One leading maker will likely do so shortly. The most desirable and larger contracts for the second quarter were taken at 20 per cent off list, and others at 15 and 10 per cent off list. The current demand is not active and specifications against contracts are fair. Makers have caught up on back orders to some extent and can now ship in 60 to 90 days from date of order. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Since the price of spikes was advanced to \$3.40 base, the demand has been very much more active. The Pittsburgh & Lake Erie has placed about 5000 kegs with two local makers, and the Baltimore & Ohio and several other roads have placed fairly large contracts for delivery in the second

half. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 10c. to 15c. We quote railroad spikes as follows: 9/16 in. and larger, \$3.40, base; 7/16 and $\frac{1}{2}$ in., \$3.50, base; 5/16 and $\frac{3}{8}$ in., \$3.75, base; boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—The new demand for wire and wire nails is not as active as prior to the holidays, and specifications against contracts are only fair. The scarcity in supply of barb wire is not so acute, due to the fact that several leading makers have finished large contracts for export and now have practically their entire output available for the domestic trade. Nothing has been heard recently of higher prices on wire products, and it is believed the larger makers now feel the market is amply high. The \$3 price on wire nails is firmly held, and, in fact, some contracts have been taken at \$3.10 to \$3.25 at mill. We quote: Wire nails, \$3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.95; galvanized wire, \$3.65; galvanized barb wire and fence staples, \$3.85; painted barb wire, \$3.15; polished fence staples, \$3.15; cement-coated nails, \$2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—There is an insistent heavy export and domestic demand for wire rods, with the available supply very light. Canada has inquiries in the market for large quantities and the export demand from other countries is large. There have been sales recently of good-sized lots of soft Bessemer and open-hearth rods as high as \$75, maker's mill. On very special quality rods, made from acid steel, and running up to 0.60 or higher in carbon, sales have been made at as high as \$100 and \$110 at mill. It is a curious fact that the price of rods for some time has been higher than plain wire and wire nails. We quote soft Bessemer, open-hearth and chain rods at \$75 to \$80 at maker's mill, Pittsburgh. For high-carbon rods, prices range from \$90 to \$110 at mill.

Iron and Steel Bars.—The new demand for steel bars is not as active as it was late last year, and specifications against contracts have quieted down to some extent. On steel bars for shipment in second and third quarters, several leading makers are quoting 3c. to 3.10c. at mill. The price of the Carnegie Steel Company on steel bars remains at 3c. at mill, with no promise of delivery. Thousands of tons of bars are piled up at various mills awaiting cars for shipment, and consumers are suffering because of this condition. The new demand for iron bars is fairly active and prices are stronger. We quote steel bars at 3c. to 3.10c. at mill for second and third quarter delivery. We quote refined iron bars at 3.25c., and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Rivets.—The domestic demand is lively, and there is also considerable export inquiry. Regular export shipments of rivets have been made for some time by several local concerns. Prices are strong, and on small lots advances of 10c. to 15c. per 100 lb. are easily obtained. Makers quote buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Nuts and Bolts.—Makers report a continued active demand. Consumers who placed contracts some time ago for nuts and bolts for delivery over the first quarter and first half of this year are specifying freely. There is also a fair export demand, but local makers are not taking such orders, being unable to get cars to make shipments. Prices are not only firm, but it is intimated they may be advanced in the near future. Discounts are as follows, delivered in lots of 300 lb.

or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2½ per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts, c. p. c. and t. sq., blank, \$2.10 off, and tapped \$1.90 off; hex., blank, \$2.50 off, and tapped, \$2.30 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Hoops and Bands.—The new demand is good, but most consumers are covered over the first quarter and others over the first half of this year. Specifications are coming in freely. The nominal price of the Carnegie Steel Company on steel hoops is 3.50c., and on steel bands 3c., with extras on the latter as per the steel-bar card. Other mills that can ship fairly promptly are quoting 3.50c. to 3.75c. on hoops and up to 3.25c. on steel bands.

Cold-Rolled Strip Steel.—Makers are expected to open their books shortly on contracts for the second quarter. Their output is well sold up over the first quarter or longer. Consumers are specifying freely. On current orders for reasonably prompt shipment makers quote \$7 for fair-sized quantities up to \$7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—The Sinclair Oil & Refining Company has definitely placed a contract with a leading mill for 500 miles of 8-in. pipe to be delivered throughout this year. The contract involves about 30,000 tons, and is for an oil line which will be laid by Booth & Flinn, Ltd., Pittsburgh. The mills have their output of lap-weld iron and steel pipe sold up over the first half of this year. Two leading makers report that with orders already on their books and business that will come to them in due course from regular customers, their output of lap-weld pipe is regarded as taken for the entire year. The demand for butt-weld sizes, used largely for building purposes, is not heavy, and the mills can make deliveries in three to four weeks. It is stated that some jobbers that have fairly large stocks of butt weld are quoting prices about as low as the mills, in an endeavor to move these stocks promptly. Prices are very firm. Discounts are given on another page.

Boiler Tubes.—The new demand for both locomotive and merchant tubes continues abnormally heavy, and leading makers have their output well sold up over the entire year. Premiums are readily paid for fairly prompt shipments. Discounts, which, however, are largely nominal, are given on another page.

Coke.—The movement of coke from ovens to blast furnaces is not any better; in fact, in the last few days it has been worse, due to a heavy fall of snow and rain. Embargoes are in effect on practically all the railroads running from the coke regions to furnaces in the Pittsburgh district and in the two valleys, and they are suffering greatly for lack of coke. Many furnaces are banked. Blast-furnace plants that have by-product coke ovens are not in any better shape, as they cannot get deliveries of coal to make coke. Furnaces that have coke bought at \$2.75 to \$3 per ton are not getting deliveries, and are buying wherever they can find it for prompt shipment, and paying \$8 to \$9 per ton. There is no relief in sight. Best grades of furnace coke for prompt shipment are quoted at \$8.50 to \$9.50 per net ton at oven, and on contracts for first half delivery the producers and dealers are still quoting \$6 to \$7 per ton, although no contracts are being closed at these prices. Best grades of 72-hr. foundry coke are held at \$10 and higher for prompt shipment, and \$7 to \$8 on contracts. The Connellsville Courier gives

the output of coke in the upper and lower Connellsville regions for the week ended Jan. 13 as 353,192 net tons, a decrease over the previous week of 5384 tons.

Old Material.—While not a great deal of scrap is moving from dealers to consumers, the tone of the market is better. Dealers are confident that prices on nearly all grades will soon move upward. There is quite a heavy demand for low phosphorus melting scrap, and prices have advanced in the past week from \$3 to \$4 per ton. Two weeks ago such scrap sold as low as \$28 in small lots, but in the past few days sales have been made at \$31 to \$33.50. One sale of 1000 tons was made at \$31.50, and much larger sales are reported as high as \$33.50. The new demand for borings and turnings is also better and prices are slightly higher. There are embargoes on scrap routed to the Jones & Laughlin Steel Company in this city and on scrap routed to Sharon and Youngstown. Prices for delivery in Pittsburgh and at other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$23.00 to \$24.00
No. 1 foundry cast	19.00 to 19.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	27.00 to 27.50
Hydraulic compressed sheet scrap	18.00 to 18.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.00 to 15.50
Bundled sheet stamping scrap	14.50 to 15.00
No. 1 railroad malleable stock	19.50 to 20.00
Railroad grate bars	12.00 to 12.25
Low phosphorus melting stock	31.00 to 33.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	50.00 to 53.00
No. 1 busheling scrap	17.00 to 17.50
Machine-shop turnings	12.25 to 12.50
Old carwheels	20.00 to 20.50
Cast-iron borings	12.25 to 12.50
*Sheet-bar crop ends	25.00 to 26.00
No. 1 railroad wrought scrap	22.00 to 23.00
Heavy steel axle turnings	15.50 to 16.00
Heavy breakable cast scrap	17.00 to 17.50

*Shipping point.

William Wieman, who recently resigned as secretary and treasurer of Banning, Cooper & Co., Ltd., Oliver Building, Pittsburgh, after a connection of nearly eight years, has opened an office in room 815, Frick Building, Pittsburgh, to handle pig iron, coke and steel products. He previously represented the Sloss-Sheffield Steel & Iron Company, Birmingham, Ala., in the Cleveland and Pittsburgh districts.

Philadelphia

PHILADELPHIA, PA., Jan. 23, 1917.

Steel mill representatives say there is less of what they term "wild-cat" inquiry. The specifications for plates are a little lighter, but inquiries for prices on new and large lots are more numerous. In the past few days Atlantic coast shipyards have inquired for about 12,000 tons to go into six ships. A foreign ship-building interest is inquiring for 30,000 tons of hull and boiler steel for 1918 shipment. Ship shapes are strong at 4c., Pittsburgh, and a shortage is indicated in view of the few mills which make them. A lot of 10,000 tons of open-hearth, soft re-rolling billets has been placed for export to Italy by one mill, at \$62.50, mill. The pig-iron market continues strong, but foundry grades are inactive except for small lots needed for filling in. Heavy melting steel and other grades of scrap continue to show an easier tendency because of the indifference of consumers.

Pig Iron.—Except for small lots needed for filling in, or to compensate for the failure of deliveries on contracts, the market has been quiet. A Virginia company whose new furnace was recently blown in has announced quotations for the last half. With other makers, it quotes No. 2 X for this delivery \$27.75, furnace, of \$30.50, Philadelphia, and 50c. less for No. 2 plain. At these prices it has booked orders for 2800 tons in the past week. Another Virginia producer is credited with quoting \$26, furnace, or \$28.75, Philadelphia, for the last half. For first half Virginia No. 2 X, \$29, furnace,

or \$31.75, Philadelphia, is quoted. A carload of special analysis Virginia iron was taken yesterday at \$29.75, furnace, or \$32.50, Philadelphia. For eastern Pennsylvania No. 2 X, the minimum is \$30, furnace, with few makers quoting that low. Several ask \$32, furnace, and for small lots have obtained around \$32.75, Philadelphia. Those quoting the higher prices are admittedly not keen for new business calling for prompt deliveries, for the reason that irregular operations and delayed shipments of coke and ore have put them far behind. Some malleable business is pending. The cast-iron pipe makers are hard hit by prevailing costs of material and labor, inasmuch as consumers cut their needs to the minimum rather than pay existing prices. A gas company, for instance, inquired for 2000 tons of pipe, but only bought 600 tons after it became posted on prices. In basic pig iron nothing has been done. Standard low phosphorus continues strong at \$55 to \$57, delivered, according to specifications. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$30.50 to \$31.50
Eastern Pa. No. 2 plain.....	30.00 to 31.00
Virginia No. 2 X foundry.....	30.50 to 31.50
Virginia No. 2 plain.....	30.00 to 31.00
Gray forge.....	28.75 to 29.25
Basic.....	30.00
Standard low phosphorus.....	55.00 to 57.00

Ferroalloys.—At \$175, furnace, domestic 80 per cent ferromanganese is more difficult to procure, consequently stronger. Foreign material, delivery in the last three quarters of the year, is strong at \$164 to \$165, seaboard. Consumers are regarding with more seriousness the situation in 50 per cent ferrosilicon, the scarcity of which is becoming more acute. The official quotations—\$99 to \$100, Pittsburgh, according to quantity—are purely nominal, \$150 being nearer the actual price for a spot delivery. Spiegeleisen is scarce and growing stronger, its quotations ranging from \$60 to \$65, furnace. Sales have been made at \$62.50.

Iron Ore.—Arrivals of foreign ore at this port in the week ended Jan. 20 consisted of 4067 tons from Spain and 6324 tons from Sweden.

Plates.—In the past few days Atlantic coast shipyards have approached the mills concerning upward of 12,000 tons of plates required for six ships. One inquiry calls for over 30,000 tons of hull and boiler steel for export shipment in 1918. The structural fabricators have more work in prospect, and one shop is asking for about 18,000 tons of universal and sheared plates. Specifications have fallen off a little in the past week, but requests for prices on large lots are more numerous. The mills are handicapped by shortage of raw materials and embargoes, and unable to produce normal output. One mill has declined export business at 6.25c. to 6.50c., these prices being acceptable to foreign shipyards. The quotations for tank plates range from 4.909c. to 5.159c., for tank plates, and 6.159c. for ship plates. Universal plates are quoted at 4.909c., Philadelphia. One mill reports that it has no plates to offer.

Billets.—Italian interests have contracted for 10,000 tons of open-hearth soft re-rolling billets for delivery in the second and third quarters at \$62.50, mill. The general quotation for such billets ranges from \$60 to \$65, mill, with forging steel at \$75 to \$85, mill. Discarded shell steel suitable for rolling is around \$40, and that adaptable to forging is quoted at \$50 and upward.

Bars.—Quotations for steel bars are unchanged at 3.409c. to 3.659c., Philadelphia, in a quiet market. Iron bars are strong at 3.159c., Philadelphia, carload lots.

Structural Material.—The market for shapes is firm at 3.659c., Philadelphia, for desirable lots, and 3.909c. for small lots for prompt shipment. League Island Navy Yard requirements amounting to 4000 to 5000 tons are understood to have been placed yesterday, and on Jan. 29 contracts will be placed for 3500 tons more for the same yard. Ship steel shapes are growing scarce under the enormous demand. The makers ask 4.159c., Philadelphia, and contemplate an increase in production.

Sheets.—No. 10 blue annealed sheets are unchanged

at 4.909c., Philadelphia. Consumers find it more difficult to get material.

Coke.—The railroad situation is a little easier, and less emphasis is being placed on backward deliveries of furnace coke. Spot is quoted at \$8.50 to \$9, and contract at \$6 to \$8.50 per net ton at oven. Spot foundry is unchanged at \$10 to \$10.50 per net ton at oven, with contracts over the first half at \$8 to \$8.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mount-
tain, \$1.65.

Old Material.—The mills are showing little or no anxiety to buy, and the situation remains a quiet one, with the export feature still attractive. Italy, in particular, is a good buyer. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$21.00 to \$22.00
Old steel rails, re-rolling.....	30.00 to 31.00
Low phos. heavy melting steel scrap.....	33.00 to 36.00
Old iron and steel axles (for export).....	43.00 to 45.00
Old iron rails.....	28.00 to 29.00
Old carwheels.....	21.00 to 21.50
No. 1 railroad wrought.....	26.00 to 27.00
Wrought-iron pipe.....	17.00 to 18.00
No. 1 forge fire.....	15.00 to 16.00
Bundled sheets.....	15.00 to 16.00
No. 2 busheling.....	13.00 to 14.00
Machine-shop turnings.....	12.75 to 13.25
Cast borings.....	13.50 to 14.00
No. 1 cast.....	20.00 to 21.00
Grate bars, railroad.....	15.50 to 16.00
Stove plate.....	16.50 to 17.00
Railroad malleable.....	17.50 to 18.00

The Seaboard Steel & Manganese Corporation, Temple, Pa., which on Feb. 1 will begin the manufacture of spiegeleisen, has appointed Frank Samuel, Harrison Building, Philadelphia, sales agent for its product.

Buffalo

BUFFALO, N. Y., Jan. 22, 1917.

Pig Iron.—The market in this district has been quiet for the week, but inquiry, while light in the aggregate, has shown indications of gradually increasing interest among buyers. Sales have been of small volume, owing to the fact that all of the blast-furnace interests are out of the market for a considerable time in the future. There is still a limited amount of resale iron available for early shipment, the total having been reduced to a point where it is only a negligible factor in the general situation. As stated in last week's report, practically the only iron obtainable by the users of this district for reasonably prompt shipment has to be furnished by other pig-iron producing sections. Where any Buffalo brand can be located for early shipment the price is not less than \$35, f.o.b. cars at furnace, except possibly for gray forge, which has been shaded slightly in some instances. Carload lots of the higher standard grades for immediate shipment, when obtainable, command \$36.50 at furnace. We quote as follows for local iron for first quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons.....	\$35.00 to \$35.50
No. 1 foundry.....	35.00 to 35.50
No. 2 X foundry.....	35.00 to 35.50
No. 2 plain.....	35.00 to 35.50
No. 3 foundry.....	35.00 to 35.50
Gray forge.....	35.00 to 35.50
Malleable.....	35.00 to 35.50
Basic.....	35.00 to 35.50
Bessemer.....	35.00 to 35.50
Charcoal, according to brand and analysis.....	35.50 to 36.00

Finished Iron and Steel.—It is understood that some second quarter contracts covering bars and structural material have been closed the past week; in some instances the contracts have been drawn limiting the class of material to be specified. Other agencies are accepting specific orders only for certain types of material and are not writing general contracts. The transportation situation in Buffalo has grown worse during the week instead of better, with little prospect of relief. Even the railroads themselves admit that conditions have further deteriorated. The demand for sheets continues urgent. The Corrugated Bar Company has received contract for 250 tons of reinforcing bars for

the construction of a factory for the Harrison Radiator Corporation, Lockport, N. Y. The Union Structural Company, Syracuse, has the contract for a small quantity of structural steel for the Harrington Theater and store building, Phoenix, N. Y., and the Lackawanna Bridge Company, Buffalo, has contracts for 1600 tons for the open-hearth building for the Worth steel works at Claymont, Del., and 800 tons for the Continental Motors Company's plant at Muskegon, Mich. A contract for 1000 tons for other work at the Worth steel works is under negotiation.

Old Material.—The demoralized condition of railroad movement is causing considerable stagnation in the transaction of new business; buying is apparently waiting some definite assurance of the clearing up of the railroad situation. Neither consumers nor sellers seem to be interested in new commitments to any large extent. Such transactions as are being consummated consist of special material required by consumers for definite uses as soon as it can be gotten through the embargoes. In consequence of this situation the prices of some commodities have sagged a little, although in a few—notably low phosphorus scrap—prices are held more firmly than heretofore. The following prices, which in many instances are nominal, represent the market as closely as possible, all being per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$25.50 to \$26.50
Low phosphorus	32.00 to 36.00
No. 1, railroad wrought	30.00 to 31.00
No. 1, railroad and machinery cast	22.50 to 23.50
Iron axles	45.00
Steel axles	45.00
Carwheels	23.00 to 23.50
Railroad malleable	22.00 to 23.00
Machine shop turnings	11.00 to 11.50
Heavy axle turnings	16.00 to 16.50
Clean cast borings	11.00 to 11.50
Iron rails	25.00 to 26.00
Locomotive grate bars	15.00 to 15.50
Stove plate	14.00 to 14.50
Wrought pipe	16.00 to 16.50
No. 1 busheling scrap	20.50 to 21.50
No. 2 busheling scrap	13.00 to 13.50
Bundled sheet scrap	14.00 to 14.50

Cleveland

[The omission of the Cleveland market report from THE IRON AGE of Jan. 18 was due to evident demoralization of the mails, the report not being received until after the paper had gone to press.]

CLEVELAND, OHIO, Jan. 23, 1917.

Iron Ore.—The record of shipments of Lake Superior ore in 1916 will not be reached this year, in the opinion of some of the ore men. They base this conclusion on several considerations. Stock piles at the mines that were large last spring, some being an accumulation of several years, were well cleaned up at the close of navigation, so that there would not be large stocks at the opening of navigation. The labor outlook at the mines is not entirely satisfactory, and a scarcity of labor is not improbable during the summer. Some furnaces, anticipating higher prices, are understood to have purchased enough ore last season to last them well into the coming summer, and there will probably also be some curtailment in the demand due to the fact that quite a few blast furnaces will be unable to keep up the production pace they have maintained in the past year. The market is inactive. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—Cleveland interests are figuring on the inquiry from J. P. Morgan & Co. for 100,000 tons or more of Bessemer iron for export. Domestic inquiry is not active. In foundry iron the demand is chiefly for small-lot sales for prompt shipment. Many consumers have not covered for the last half, but are still holding off. The Cleveland price on foundry iron is higher, owing to the fact that one local interest that has been selling foundry iron at \$31 and lower has advanced to \$32, at furnace, for No. 2 for both city and outside shipment. Car-lot sales in the Valley are reported at \$32 and \$33. Deliveries of Southern iron have improved somewhat, owing to the lifting of the embargo at Cincinnati. A Tennessee furnace that has been selling No. 2 foundry at \$22, Birmingham, for the last half has advanced its price to \$22.50 for that

delivery. For the first half, Southern resale iron is quoted at \$23 and furnace iron at \$24. We note the sale of 500 tons of Tennessee 8 per cent silicon iron for last half delivery at \$29, at furnace, or \$33 delivered at a near-by stove foundry, or several dollars lower than the market for Ohio silvery. We quote, delivered Cleveland, as follows:

	Jan. 23	Jan. 16
Bessemer	\$35.95	\$35.95
Basic	30.95	30.95
Northern No. 2 foundry	\$31.95 to 32.30	\$30.75 to 31.30
Southern No. 2 foundry	26.50 to 28.00	26.00 to 29.00
Gray forge	29.95	29.95
Ohio silvery, 8 per cent silicon	37.62 to 39.62	38.62 to 39.62
Standard low phos., Valley furnace	50.00 to 51.00	50.00 to 51.00

Coke.—There is some demand for foundry coke for prompt shipment, which is quoted at \$10 to \$10.50 per net ton at oven for standard Connellsville makes. Producers generally are unwilling to quote prices on contracts. Spot furnace coke is quoted around \$8. Shipments from the Connellsville district show little if any improvement, and it takes about 30 days for a carload of coke to get from the producer to the consumer. Corrigan, McKinney & Co. have started up the second battery of their coke ovens in Cleveland, and will have a daily output of about 2500 tons. In addition to supplying coke for their river furnaces in Cleveland and Genesee furnace in Charlotte, N. Y., they will have a small amount of coke to place on the market.

Bolts, Nuts and Rivets.—The automobile trade is expected to place contracts shortly for bolts and nuts for the season's requirements, a considerable portion of this trade not having previously covered. Some inquiry is now coming from this source. Specifications have been light this month, as was to be expected in January, but these are about keeping up with shipments. Prices are firm. Rivet specifications are coming out in good volume and deliveries are somewhat better. We quote rivets at 3.25c., Pittsburgh, for structural and 3.75c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and 2½; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank \$2.25 off; tapped, \$2.00 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Finished Iron and Steel.—Very little steel is coming into this territory from the Pittsburgh district or from Eastern mills, because of the railroad embargoes, and the situation has become a very serious one with many manufacturers who are badly in need of material. There is considerable slackening in the demand, both in specifications and in new business. Some consumers appear willing to take their chances with the future market rather than contract for nearly a year ahead at present prices. A number of manufacturers who need steel for specific work are unable to secure mill deliveries as soon as wanted, and face the alternative of buying stock from warehouse and storing it until needed. The only easing up in deliveries appears to be on shafting. The demand for plates continues heavy and the local market is firm at a minimum price of 5c., Pittsburgh. A sale of 3500 tons of plates and structural material has been made for an oil boat for the Lakes to be built by the American Shipbuilding Company for the Standard Oil Company, and an inquiry is pending from Erie, Pa., for 4800 tons of plates for tank cars. Railroads, to help in the efforts to provide more motive power, have issued notices that embargoes will not be applied to steel consigned to locomotive builders. Structural material is in light demand. Considerable building work is being postponed because of the high cost of material and labor. One mill that is able to make deliveries in three or four months has advanced its price on steel bars to 3.50c., Pittsburgh. Hard steel bars are in fair demand and are quoted at 3c. to 3.25c. at mill. Iron bars are quoted at 3c., Cleveland and Pittsburgh. Sheets are in good demand and mills are getting maximum prices for small lots. We quote sheets at 4.50c. to 5.50c., Ohio mill, for No. 28 black,

4.25c. to 5c. for No. 10 blue annealed, and 6.50c. to 7.50c. for No. 28 galvanized. Warehouse business continues active. Warehouse prices are 3.25c. for steel bars under 2 in., 3.95c. for structural material, 4.60c. for plates, 4.75c. for hoops, 5c. for black sheets, and 4.75c. for blue annealed sheets.

Old Material.—Cleveland mills are entirely out of the market, being well supplied with scrap for several weeks. About the same situation exists in respect to Valley mills. There is a moderate volume of trading between dealers to cover on existing contracts, and plenty of material is being offered to supply the demand, dealers apparently being less disposed to hold their material for high prices than was the case a week ago. Prices are not firm. Most prices are unchanged, but several of these are nominal. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$21.00 to \$21.50
Steel rails, rerolling	28.00 to 29.00
Steel rails under 3 ft.	23.00 to 24.00
Iron rails	28.00 to 28.50
Steel car axles	48.00 to 49.00
Heavy melting steel	22.00 to 22.50
Carwheels	20.00 to 20.50
Relaying rails 50 lb. and over	37.00 to 38.00
Agricultural malleable	15.00 to 15.50
Railroad malleable	20.50 to 21.00
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	14.50 to 15.00
Per Net Ton	
Iron car axles	\$44.00 to \$45.00
Cast borings	9.50 to 9.75
Iron and steel turnings and drillings	9.50 to 9.75
No. 1 busheling	18.00
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	17.75 to 18.25
Railroad grate bars	13.50 to 13.75
Stove plate	13.25 to 13.50

Cincinnati

CINCINNATI, OHIO, Jan. 24, 1917.—(By Wire.)

Pig Iron.—A southern Ohio melter has purchased 1000 tons of Southern foundry iron for last half shipment, but other contracts in this vicinity are only for small lots. While there is but little buying for the first half, prices have been well maintained and are on a higher level than for the last half. Approximately 2000 tons of Southern iron was sold to three Canadian purchasers for March-June shipment. Some Southern iron sales are also reported as having been made in Michigan and Illinois. The general inquiry is light, with the malleable inquiries reported last week still pending. On Ohio silvery irons, still quoted at \$37.50 to \$39, furnace, on an 8 per cent analysis, no recent business has been booked beyond a few carload lots urgently needed for special mixtures. Northern furnaces are sold up for some time to come and there is not much business that could be booked in the Hanging Rock district for nearby shipment. The price remains firm at \$30, Iron-ton, for any shipment this year on No. 2 foundry, basic and malleable. The railroad freight embargo has been extended, as far as the Northern roads are concerned, but the situation has been relieved somewhat on the Southern lines. No sales of Virginia iron have been reported in the past few days. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Iron-ton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$26.40 to \$28.40
Southern coke, No. 2 f'dry and 2 soft	25.90 to 27.90
Southern coke, No. 3 foundry	25.40 to 27.40
Southern coke, No. 4 foundry	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon	37.25 to 38.25
Southern Ohio coke, No. 1	31.76
Southern Ohio coke, No. 2	31.26
Southern Ohio coke, No. 3	30.76
Southern Ohio malleable Bessemer	31.26
Basic, Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel	27.90 to 28.40

(By Mail)

Finished Material.—Sheets are firm. Nearby rolling mills are quoting on No. 28 galvanized sheets from 6.90c. to 7.15c., Cincinnati or Newport, Ky., and No. 28 black sheets at 5.15c. to 5.25c. Automobile manufacturers are buying heavily even at these high prices. The local warehouses are only doing a small business in sheets now as their stocks are practically depleted. The prompt demand for sheets from the South is slow, but the inquiry from that district indicates that spring

business will be good. Building operations have been suspended on account of the weather, and as a consequence the call for structural shapes and other building materials is limited. Prices are firm and we quote from warehouse stocks as follows: Wire nails, \$3.40 per keg, base; barb wire, \$3.40 per 100 lb.; structural shapes, 3.90c.; plates, 4.70c.; steel bars, 3.80c., and round head rivets, 4.50c.

Coke.—The railroad situation is much worse, due to weather conditions and to the reinstatement of embargoes by several roads. Foundry coke for spot shipment, when it could be moved to destination, has brought all the way from \$10.50 to \$13 per net ton and quite a number of cars that were en route were readily disposed of at \$12. Contract figures that were given 10 days ago around \$7.50 per net ton at oven in the Wise County district have been marked up \$1 to \$1.50 per ton and the same advance has been made on Connellsville coke.

Old Material.—Business is dull with the exception of the demand from nearby foundries and rolling mills. The movement of scrap to the Pittsburgh territory has almost been cut off and incoming shipments are also light. However, prices are firm and no change is noted from the previous report. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$14.00 to \$14.50
Old iron rails	24.25 to 24.75
Relaying rails, 50 lb. and up	27.75 to 28.25
Rerolling steel rails	24.25 to 24.75
Heavy melting steel scrap	20.25 to 20.75
Steel rails for melting	20.25 to 20.75
Per Net Ton	
No. 1 railroad wrought	\$21.00 to \$21.50
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	15.75 to 16.75
No. 1 machinery cast	17.50 to 18.00
Burnt scrap	9.75 to 10.25
Iron axles	32.50 to 33.00
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	13.25 to 13.75
Malleable cast	14.75 to 15.25
Railroad tank and sheet	11.75 to 12.25

St. Louis

ST. LOUIS, MO., Jan. 22, 1917.

Pig Iron.—A renewal of interest is apparent, with a considerable number of inquiries and a few sales. Those actually closed during the week were small lots, mainly for first half delivery, ranging from 300 tons down. The inquiries include one for 300 tons and one for 1000 tons of No. 2 Southern, one for 1000 tons of No. 2 Northern, one for 500 tons of high silicon, and one for 300 tons of No. 1 Northern. Included in the sales were one of 300 tons of Lake Superior charcoal iron and one of 300 tons of No. 2 Southern special delivery.

Coke.—The situation is unrelieved, and sales to meet imperative requirements continue to be made at \$11 to \$12 per ton, Connellsville. No inquiries are appearing for forward contracting.

Finished Iron and Steel.—No inquiries nor forward contracts are reported, but specifications are heavy and urgent. Light rails are in strong demand. Fastenings are at a premium, with the exception of spikes, which are in fair shape as to deliveries. Stock out of warehouse continues in very active demand at the high prices, and the movement is heavy at the following quotations: Soft steel bars, 3.80c.; iron bars, 3.75c.; structural material, 3.90c.; tank plates, 4.55c.; No. 10 blue annealed sheets, 4.70c.; No. 28 black sheets, cold-rolled, one pass, 5.30c.; No. 28 galvanized sheets, black sheet gage, 7.50c.

Old Material.—A firmer feeling, with increased demand from both outside and local sources, is apparent. Rolling mill and steel grades are in special request. Dealers continue to do a considerable amount of trading to even up their contracts. Relaying rails are the scarcest material, and prices quoted are exceptionally strong and firm. There is a general feeling that there will be a more active market after the first of the month, when all the conditions of the inventory and a new-year period are past. We quote dealers' prices,

f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$26.00 to \$26.50
Old steel rails, rerolling	26.50 to 27.00
Old steel rails, less than 3 ft.	27.00 to 27.50
Old steel rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	18.50 to 19.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.00 to 19.50
Ordinary shoveling steel	17.50 to 18.00
Prags, switches and guards cut apart	22.00 to 22.50
Bundle sheet scrap	13.50 to 14.00

Per Net Ton	
Iron angle bars	\$26.00 to \$26.50
Steel angle bars	21.00 to 21.50
Iron car axles	36.50 to 37.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	22.50 to 23.00
No. 2 railroad wrought	21.50 to 22.00
Railroad springs	23.50 to 24.00
Steel couplers and knuckles	24.00 to 24.50
Locomotive tires, 42 in. and over, smooth inside	26.00 to 26.50
No. 1 dealers' forge	17.00 to 17.50
Cast iron borings	8.00 to 8.50
No. 1 bushing	15.50 to 16.00
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 railroad cast scrap	14.00 to 14.50
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	13.50 to 14.00
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Heavy axle and tire turnings	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Jan. 22, 1917.

Pig Iron.—Little buying is now being done in this market. Out of the few sales made by one company, the largest was 200 tons of No. 2 soft for immediate delivery at \$24; one or two spot carloads went at \$25, one small lot for second quarter at \$24 and one or two small lots of special analysis at \$25.50 and \$26.50. The Alabama Company sold a number of small lots to regular customers at \$24 without reference to time of delivery. The largest foundry-iron producer continues selling on a uniform basis of \$24 for any delivery. The leading interest quotes \$23 for the second half, but asks \$25 for spot. The spot market is, therefore, from \$24 to \$25. At least one other maker expresses willingness to do business with desirable customers for the second half at \$23. The market is rather more definite than it has been in some time. Consumers are pressing for delivery. Cancellations are unheard of. Embargoes at the ports of Savannah and Norfolk have served to tie up considerable metal moving to the North by rail and water. However, shipments are heavy and the enormous make will be taken care of, whether prior accumulations decrease or not. One company making 25,000 tons per month had shipped 20,000 tons by the 18th of the month. The Alabama Car Service Association reports for December a total movement of 85,000 cars, as compared with 80,000 in December, 1915. Some of the larger cast pipe buyers are expected in the market soon. The general opinion of furnacemen is that a rise is probable with the next real buying movement. We quote, per gross ton, f.o.b. Birmingham district furnaces for early delivery as follows:

No. 1 foundry and soft	\$24.50 to \$25.50
No. 2 foundry and soft	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
No. 4 foundry	23.25 to 24.25
Gray forge	23.00 to 24.00
Basic	24.50 to 25.50
Charcoal	25.00 to 26.00

Cast-Iron Pipe.—Manufacturers express themselves as inclined to be satisfied with the new business that has come in spite of high prices and the dull season in building operations. They reiterate that there are very desirable contracts held up on account of prices. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$39; 6-in. and upward, \$36, with \$1 added for gas pipe.

Coal and Coke.—Coal continues active, owing to the heavy consumption of railroads and manufacturing plants. The apex in prices has been reached. Good steam coal can now be had around \$2 per net ton. Coke is scarce. The lowest sold under contract to regular

customers brings \$7.50 per net ton at oven for standard beehive foundry, with \$10.50 and \$11 for spot. Furnace coke brings as high as \$5 per ton. However, furnace interests are well taken care of by their own plants.

Old Material.—The market is weak. All grades of steel melting scrap are off about \$1 per ton and cast scrap is also affected. We quote, per gross ton, f.o.b. Birmingham yards, as follows:

Old steel axles	\$32.00 to \$35.00
Old steel rails	18.00 to 18.50
No. 1 wrought	18.00 to 18.50
Heavy melting steel	15.50 to 16.00
No. 1 machinery	17.00 to 17.25
Carwheels	14.00 to 14.50
Tram carwheels	12.50 to 13.00
Stove plate and light	12.50 to 13.00

New York

NEW YORK, Jan. 24, 1917.

Pig Iron.—Whether or not buyers are looking for cheaper iron, they are holding off from the market so far as second half deliveries are concerned, and those who need iron for their current melt are buying in small lots. Export buyers of pig iron are open to quotations from any source and are willing to receive prices on any quantities producers are able to furnish in the second quarter or the second half. Their disposition is to keep in touch with iron available for export. Inquiry is still out for Bessemer iron of 0.06 to 0.08 phosphorus to go abroad. Switzerland and Portugal are in the market for No. 2 X foundry, low phosphorus, and standard Bessemer irons. Virginia furnaces are quoting from \$27 to \$29 for early delivery iron. One interest there is willing to sell second half iron at \$26 for No. 2 X. Foundries in the Metropolitan and New Jersey districts are buying little iron, having plenty coming to them under their contracts. Buffalo furnaces have been quoting \$35, but the effect of the addition of two furnaces to the producing list in that district remains to be seen. We quote at tidewater for early delivery: No. 1 foundry, \$31; No. 2 X, \$30 to \$31; No. 2 plain, \$29 to \$30; Southern iron at tidewater, \$30 for No. 1 and \$29 to \$30 for No. 2 foundry and No. 2 soft.

Ferroalloys.—As high as \$185, delivered, is understood to have been recently asked for domestic ferromanganese, but no business at that figure is reported. Sales of 150 tons and less have been made at \$175, delivered, which is still the quotation for the domestic product, while \$164, seaboard, is still asked for the British alloy. Inquiries are very few and the market is generally dull. Spiegeleisen, 20 per cent, is more active at \$60, furnace, and sales of 1500 to 2000 tons have recently been made. The production in the near future of spiegeleisen by the Seaboard Steel & Manganese Corporation at its Temple furnace near Reading, Pa., will add considerably to the supply, and it is understood that a sale involving quite a large amount has very recently been made, possibly involving part of the output of this company, but the details are not known. Ferrosilicon, 50 per cent, is very scarce and some consumers are anxious as to their supplies. Considerable foreign inquiry also adds to the interest in the future of this material, Japan asking for 100 tons. As high as \$140 to \$150 per ton has been paid by those needing the alloy at once, and sales at \$115 to \$120 have not been uncommon. Contract material is still quoted at \$99 to \$100 delivered.

Structural Material.—The American Bridge Company has been awarded the contract for 15,700 tons of steel for the Livonia Avenue elevated line in Brooklyn. It is understood that all the steel must be delivered within nine months from the signing of the contract and that for the 600 tons of beams \$84 a ton was bid and for the 15,100 tons of riveted steel \$91 a ton. Specifications will soon be put out for 35,000 tons of steel for two new subway and elevated projects, one an elevated line in Brooklyn. Westinghouse, Church, Kerr & Co. were awarded 7800 tons for an erecting shop and an assembling building for the new plant of the Westinghouse Electric & Mfg. Company at Essington, Pa. The McClintic-Marshall Company is reported

the successful bidder. At least 30,000 tons of steel will probably be required to complete this plant. The 2500-ton loft at Broadway and Twenty-first Street for the Bradish-Johnson Estate has been awarded to Milliken Brothers, but the 1900 tons for the contemplated addition to the Abraham & Straus store in Brooklyn has been definitely abandoned. Bids are to go in Jan. 29 on 9000 tons of steel for the Philadelphia Navy Yard at League Island, including 5000 tons for a crane runway. The Lucius Apartments in the Grand Central district, between Forty-sixth and Forty-seventh streets, 9000 tons, will soon come up for bids, while the Eaton Department Stores are about to ask for bids on 8000 to 10,000 tons for a new store in Toronto, Canada. Lewis F. Shoemaker & Co. has taken 100 tons for a freight warehouse and bridge work at Baltimore for the Pennsylvania Railroad. The market in general is quiet but several large apartment houses for New York are being discussed. We quote mill shipments of shapes in two to five months at 3.419c. to 3.669c. New York; at convenience of the mill, 3.269c. New York, and warehouse shipments at a minimum of 3.95c. New York.

Plates and Bars.—Foreign demand continues to be the prominent feature. Very recently a sale to Japan of 3000 tons of ship plates, with delivery of 500 tons per month for the last half of this year, was made at 6c. per lb., f.o.b. mill, while 1000 tons for March-April delivery has gone to the same consumer at 5½c. It is interesting to note that the cost of transporting these plates from the producer to the consumer in Japan is about 2c. per lb., making the final cost from 7½c. to 8c. in Japan. A Japanese buyer, active in this market recently, has still 20,000 tons of shipbuilding steel to buy. One eastern mill is obtaining 6c. per lb. for ship plates for delivery in the first quarter of 1918, while 5c. is asked for the last half of this year for certain kinds. Inquiries for boiler plate, while fairly numerous, are not urgent, and it is interesting that for certain specifications about 5c. per lb. is asked while for boiler plates involving United States inspection 10½c. to 12c. is the range. Domestic demand is generally quiet, though there are occasional sales of small lots for special purposes at 5c. to 7c. per lb. for early delivery. Very few contracts have been made for cars recently. The Pressed Steel Car Company will build 1000 steel hopper cars for the Virginian Railway, and the Richmond, Fredericksburg & Potomac will very soon purchase 300 to 400 box cars. It is confidently expected that the orders for 20,000 French cars will be placed within 10 days, part of the order going to Canadian makers. Besides these there are at least 5000 in prospective foreign orders, including 1500 gondolas for the National Railways of Spain and 2500 cars for the Italian State Railways, which will be placed very soon. With the placing of these 25,000 cars it is pointed out that car builders' capacity will be very fully taken for some time to come. We quote universal and ordinary tank plates at 4.669c. to 5.169c., New York, but ship plates at 5.169c. to 6.169c., and late 1917 plates at 3.769c., New York. Out of store we quote 4.75c., New York, for plates under 36 in. in width and 5c. on wider plates. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are again \$2 per ton higher, or 3.70c., and steel bars are 3.85c., New York.

Cast-Iron Pipe.—All bids on 2500 tons have again been rejected by the city of Boston. No announcement has yet been made as to when the third series of bids will be received. No municipal lettings of importance are in sight. The general trade is quiet but prices are firmly maintained on the basis of \$41.50 per net ton, tidewater, for carload lots of 6-in., class B and heavier, with class A and gas pipe taking an extra of \$1 per ton.

Old Material.—It is understood that a large volume of export business is being conducted in which heavy melting steel scrap is figuring to a greater extent than heretofore. On such scrap, conforming strictly to export requirements, it is understood that \$21.50 per gross ton alongside vessel is being paid. The domestic

demand is light for steel scrap but some movement is reported in borings and turnings and wrought pipe. Railroad wrought scrap is dull and lower. Brokers quote buying prices as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment).....	\$17.50 to \$18.00
Old steel rails (short lengths) or equivalent	18.50 to 19.00
Relaying rails	37.00 to 38.00
Rerolling rails	27.00 to 27.50
Iron and steel car axles (for export) ..	43.00 to 43.50
No. 1 railroad wrought	22.00 to 23.00
Wrought-iron track scrap	21.00 to 21.50
No. 1 yard wrought, long	20.00 to 20.50
Light iron (nominal)	4.50 to 5.00
Cast borings (clean)	10.50 to 11.00
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings (nominal) ..	8.00 to 8.50
Wrought pipe (not galvanized or enameled)	15.50 to 16.00

Foundries continue to buy in small quantities only and are bidding lower prices than dealers care to consider. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast	\$18.50 to \$19.00
No. 2 cast	16.50 to 17.00
Stove plate	14.00 to 14.25
Locomotive grate bars	14.00 to 14.25
Old carwheels	20.00 to 20.50
Malleable cast (railroad)	18.00 to 18.50

Chicago

CHICAGO, ILL., Jan. 24, 1917.—(By Wire.)

Congestion of transportation and delayed deliveries of materials from the producers continue to set up a pressure in the markets. The necessities of buyers, however, appear to be occasioned more by emergency requirements arising out of the above causes than from the incurring of obligations for new projects. Caution is being exercised as regards the future in much greater degree than was discernible a few months ago, but the great momentum of business is unchecked. Producers using pig iron and semi-finished steel are bending their efforts to convert their obligations to take high-priced materials into finished products as rapidly as possible, and in many cases are pressing for the anticipation of contracts. The inquiry for cars for France has brought 20,000 for consideration in this market, involving about 100,000 tons of steel. Local car buying is for the time being quiet. The only rail purchase of note is that of 10,000 tons for the Alaskan project. The letting of contracts by Armour & Co. for 20,000 tons of steel for the new packing plant at St. Paul and the inquiries of the Iroquois Iron Company for steel for a new blast furnace and of the Mark Mfg. Company for 4000 tons for a new mill are interesting exceptions to the general halt in structural steel buying. The demand for plates is limited only by the ability of the mills to sell. Pig iron and scrap are being bought only in small quantities and the market in this direction is inactive.

Pig Iron.—The market continues quiet, with transactions merely representative of spot requirements and supplemental purchases. An inquiry for 1000 tons of Southern iron for an implement manufacturer is noted, and a like amount of basic has been sold. For a lot of 300 tons of malleable iron for first half the furnace secured a price of \$32. A little standard Bessemer has been moving, the price remaining on the basis of \$35, Valley. The quotations for Northern iron are unchanged, last half sales being made at \$30, and first half, usually in lots of 500 tons and less, at prices up to \$32, the furnaces profiting in the strength of their position. Melters of pig iron, on the other hand, are seeking to have contracts anticipated, desiring naturally to advance the time of consuming their high-price iron as rapidly as possible. Railroad congestion is still seriously interfering with deliveries of iron in transit. Selling of Southern iron into Canada from Chicago has been an interesting and unusual feature of the week. Prices at Birmingham are on the basis of \$23 for No. 2, but sales of warrant iron were made last week at \$1 per ton less. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered

at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$31.75 to \$32.75
Lake Superior charcoal, No. 1.....	\$32.25 to \$33.25
Lake Superior charcoal, No. 6 and Scotch.....	\$32.75 to \$33.75
Northern coke foundry, No. 1.....	\$31.00 to \$32.00
Northern coke foundry, No. 2.....	\$30.00 to \$31.00
Northern coke foundry, No. 3.....	\$29.50 to \$30.50
Northern high phosphorus foundry.....	\$27.00 to \$28.00
Southern coke No. 1 f'dry and 1 soft.....	\$27.50 to \$28.50
Southern coke No. 2 f'dry and 2 soft.....	\$27.00 to \$27.50
Malleable Bessemer.....	\$31.00 to \$32.00
Basic.....	\$31.00
Low phosphorus.....	\$50.00 to \$55.00
Silvery, 8 per cent.....	\$38.50 to \$39.00
Bessemer ferrosilicon, 10 per cent.....	\$46.50 to \$47.00

(By Mail)

Rails and Track Supplies.—The Government has placed its order for 10,000 tons of rails for the Alaskan railroad at Chicago, the balance of the 25,000 tons to be bought later in the year. The Pennsylvania Lines have withdrawn their inquiry and the Northern Pacific has postponed its expected purchase, but the Baltimore & Ohio has reinstated its inquiry for 25,000 tons. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$44; 16 to 20 lb., \$45; 12 lb., \$46; 8 lb., \$47; angle bars, 2.25c.

Structural Material.—The purchase of 20,000 cars for France is being negotiated in this market, but the cars are small, requiring only 4 to 5 tons of steel per car. Car business closed last week was limited to 500 refrigerators bought by the Northern Pacific from the Pullman Company. New projects necessitating the placing of orders for structural steel with the mill are almost of necessity impossible, but arrangements have been completed for the building of a packing plant for Armour & Co. at St. Paul, for which the Hansell-Elcock Company and the American Bridge Company jointly will fabricate 20,000 tons, while the Iroquois Iron Company is asking for prices on the steel for a new blast furnace, probably 3000 tons, and the Mark Mfg. Company is receiving bids on 4000 tons for a new mill. The buying of steel for bridges by the railroads appears also to have been in excess of what has been generally reported. The Northern Pacific last week took 1600 tons from the American Bridge Company. Other smaller contracts closed in the week totaled about 1000 tons. The Virginia Bridge & Iron Company will supply 1600 tons of steel for two sugar houses in California. We quote for Chicago delivery of plain material from mill 3.289c. to 3.689c.

We quote for structural steel out of jobbers' stocks at Chicago 3.85c.

Plates.—There is no let-up in the demand, though the last week did not bring forth any particular inquiries of as large size as have been common recently. The local mill, which had a limited tonnage of tank plate to offer for second quarter, disposed of all it could sell almost over night, securing prices ranging from 4.50c., Pittsburgh, to 5c. at the mill, and is again out of the market. Other mills offering plates, up to 72 in. wide, are asking a minimum of 5c. for small lots for early delivery. We quote for Chicago delivery of plates from mill, at its convenience, 3.789c. for prompt shipment; in widths up to 72 in., 4.689c. to 5.189c., and for wide plates, 4.939c. to 6.25c., depending upon deliveries.

We quote for Chicago delivery of plates out of jobbers' stocks 4.50c.

Sheets.—Except for some easing of prices of galvanized sheets as a result of more favorable purchases of spelter by some of the mills, the situation as regards sheets shows little or no change in respect of availability or prices. Of the sheets which the mills have to offer, almost all are of Bessemer steel. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum

prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4.65c.; No. 28 black, 5.15c.; No. 28 galvanized, 7.25c.

Bars.—Inquiry for steel bars from the manufacturing trade has come to some of the mills in such volume as to be the occasion of comment, but with the exception of a limited supply of Bessemer bars, substitute materials in the form of bar iron and rail carbon steel are generally offered. Users of reinforcing steel are showing an interest in first half contracts for spring work. The rerolling mill of the Inland Steel Company is to be down for about a week for the installation of a new stand of rolls which will provide for the conversion of discard billets. Prices continue without change. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3c. to 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—Heavy specifying against contracts continues to load up the bolt and nut works and new business is more than enough to equal expiring contracts. We quote as follows: Carriage bolts up to $\frac{3}{8}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{8}$ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.15c., base, Chicago, in car load lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{8}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{8}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50.

Old Material.—Buyers have not yet been called upon to change their attitude, indicating that the offerings of such scrap as must be moved are sufficient to meet current requirements. Transactions in wrought scrap and turnings suggest a slightly weaker market for these grades but prices are not quotably lower. Car-wheels, which were bought freely by the dealers a few weeks ago on the rising market, are now to be had at lower prices and 2000 tons was sold as low as \$18.50. Steel axles are also changing hands at lower prices. In general the market has been very quiet. The only railroad offering of scrap of consequence is a list from the Chicago, Burlington & Quincy. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$27.00 to \$28.00
Relaying rails.....	30.00 to 31.00
Old carwheels.....	18.50 to 19.50
Old steel rails, rerolling.....	27.00 to 28.00
Old steel rails, less than 3 ft.....	24.50 to 25.00
Heavy melting steel scrap.....	21.00 to 22.00
Frogs, switches and guards, cut apart.....	21.50 to 22.00
Shoveling steel.....	18.00 to 19.00
Steel axle turnings.....	13.50 to 14.00

Per Net Ton	
Iron angles and splice bars.....	\$26.50 to \$27.00
Iron arch bars and transoms.....	27.00 to 27.50
Steel angle bars.....	20.50 to 21.00
Iron car axles.....	34.00 to 35.00
Steel car axles.....	34.00 to 35.00
No. 1 railroad wrought.....	23.50 to 24.00
No. 2 railroad wrought.....	22.50 to 23.00
Cut forge.....	22.00 to 22.50
Pipes and flues.....	14.00 to 14.50
No. 1 busheling.....	17.00 to 17.50
No. 2 busheling.....	12.75 to 13.25
Steel knuckles and couplers.....	22.50 to 23.00
Steel springs.....	23.50 to 24.00
No. 1 boilers, cut to sheets and rings.....	13.00 to 13.50
Boiler punchings.....	18.50 to 19.00
Locomotive tires, smooth.....	23.00 to 23.50
Machine-shop turnings.....	9.25 to 9.75
Cast borings.....	9.00 to 9.50
No. 1 cast scrap.....	15.50 to 16.50
Stove plate and light cast scrap.....	11.50 to 12.00
Grate bars.....	13.00 to 13.50
Brake shoes.....	13.00 to 13.50
Railroad malleable.....	17.50 to 18.00
Agricultural malleable.....	14.75 to 15.25

Cast Iron Pipe.—Formal award of the pipe contract

at Cleveland, Ohio, has been made to the leading interest. The lettings at Springfield, Ill., and Pontiac, Mich., for 1200 tons each, remain to be closed. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$44.50; 6-in. and larger, \$41.50, with \$1 extra for class A water pipe and gas pipe.

Wire Products.—New contracts for wire products show no falling off in the demands of the trade and the fact that stocks in the hands of jobbers and dealers are less than normal despite the continuous buying of the past several months points to actual consumption of large proportions. Deliveries of nails and barb wire range from six to nine weeks late. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.239; wire nails, \$3.189; painted barb wire, \$3.339; galvanized barb wire, \$4.039; polished staples, \$3.339; galvanized staples, \$4.039, all Chicago.

British Steel Market

Ferromanganese and Pig Iron Firm—Mild Steel Plates at High Prices

LONDON, ENGLAND, Jan. 24, 1917—(By Cable.)

The pig-iron market is firm, with hematite iron active, but export business continues restricted. Tin plates are irregular and stock plates are nominal, government orders being booked at 27s. base. Ferromanganese is firm. Semi-finished steel is strong, with very little being offered. Mild steel plates are commanding £31 to £32 c.i.f. for early shipment. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 34s. 6d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.
Hematite pig iron, f.o.b. Tees, 142s. 6d.
Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.
Ferromanganese, £34 to £36 and upward.
Ferrosilicon, 50 per cent, c.i.f., £29 10s.

American Semi-Finished Steel at a Standstill—Tin-Plate Market Tighter

LONDON, ENGLAND, Jan. 2, 1917.—(By Mail)

Political developments have not had the least effect on the market, and operations are almost entirely under government control. Working conditions are as satisfactory as could be expected. General export business has been more restricted, through temporarily curtailed license facilities, or a less insistent demand. Under the circumstances home needs are being met more adequately.

Cleveland iron producers have generally postponed the booking of new orders owing to the newly created Cleveland Founders' Committee, whose sanction is now needed before actual buying is possible. A similar committee is now operating in Scotland. Large quantities of foundry iron are already under contract, and Northern consumers are somewhat concerned as to future deliveries. The position of hematite is easier, and the issuance of export permits will doubtless be resumed soon on a larger scale. It is probable that output also will be increased. Pig iron quotations have remained practically stationary.

In finished steel operations are being pushed at full pressure. Merchant business has been practically driven out of existence with no hope of a revival so long as the war lasts.

The position of tin plates is tightening gradually as the deliveries of steel to the mills are further curtailed. Export business is seriously handicapped through lack of permits, and the supply of stock plates is shrinking steadily. There is practically nothing doing in galvanized sheets, but the tendency is very firm.

Although business in American semi-finished material has come virtually to a standstill, British consumers showing but little interest in the market, new buying is undoubtedly more difficult than at any time since the war began. Not only have terms been raised

further, but there are very few offers reported even for far forward shipment, and for these prices ranging from \$90 to \$95 for 4-in. billets, c.i.f. Liverpool, are named. Wire rods are considerably dearer, but quite nominal at £25 upward, c.i.f. Liverpool.

Arrangements have been completed for the amalgamation of the interests of David Colville and Sons (Limited), steelmakers, and Archibald Russell (Limited), coalmasters, the largest privately owned concerns in their particular industries in Scotland.

Iron and Industrial Stocks

NEW YORK, Jan. 24, 1917.

The stock market has gone through another attack of weakness, partly by reason of the abrupt decline in Bethlehem Steel and partly on account of the wild rumors which preceded the President's peace address to the Senate on Monday. The great decline in Bethlehem Steel common occurred last Friday when the low point of 396 was reached, which marked a total fall of 304 points from the top touched in the stock market boom of last November. The main reason for this decline was the report of an impending large issue of bonds. Among the strongest stocks in resisting the general tendency to decline were United States Steel common and Republic common, while New York Air Brake and Pressed Steel common advanced with rumors of a possible increase in the dividend rate. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	27 - 28 7/8	Int. Harv. of N. J., pref.	121
Allis-Chal., pref.	84 - 84 3/4	Int. Harv. Corp., com.	85 - 87
Am. Can. com.	46 - 48 1/4	Int. Harv. Corp., pref.	112 3/4 - 114
Am. Can. pref.	109 1/4 - 110 1/2	La Belle Iron, com.	78 - 81
Am. Car & Fdy., com.	66 3/4 - 69 1/4	Lacka. Steel, com.	84 - 87 1/4
Am. Car & Fdy., pref.	118 1/4 - 118 1/2	Lake Sup. Corp., com.	19 - 20 1/4
Am. Loco., com.	75 1/2 - 80	Midvale Steel, com.	59 3/4 - 63
Am. Loco., pref.	105 1/4 - 106 3/4	Nat. En. & Stm., com.	28 - 32 1/2
Am. Rad., com.	410	Nat. En. & Stm., pref.	97 - 98
Am. Ship. com.	62 - 64	N. Y. Air Brake, com.	146 1/4 - 153
Am. Ship. pref.	95	Nova Scotia Stl., com.	115 1/2 - 117 1/4
Am. Steel Fdries, com.	59 1/2 - 61 1/4	Pitts. Steel, pref.	101 - 102
Bald. Loco., com.	54 1/2 - 58 3/4	Pressed Stl., com.	78 - 81 1/4
Bald. Loco., pref.	101 1/4	Pressed Stl., pref.	105 1/4 - 106
Beth. Steel, com.	396 - 476	Ry. Steel Spring, com.	50 3/4 - 52
Beth. Steel, pref.	125 - 135	Ry. Steel Spring, pref.	101
Case (J. I.), pref.	87	Republic, com.	78 1/4 - 81
Central Fdry., com.	19 - 21	Republic, pref.	104 1/2 - 105
Central Fdry., pref.	39 1/2 - 41	Sloss, com.	65 - 69
Chic. Pneu. Tool, com.	72 1/2 - 75	Un. Alloy Steel, com.	49 3/4 - 52 1/4
Colo. Fuel, com.	46 1/2 - 48	U. S. Pipe, com.	21 3/4 - 23 1/4
Cruc. Steel, com.	62 3/4 - 66 3/4	U. S. Pipe, pref.	61 - 62
Deere & Co., pref.	99 - 99 3/4	U. S. Steel, com.	112 1/4 - 115 1/4
Driggs-Seabury, com.	50 1/4 - 53	U. S. Steel, pref.	120 3/4 - 121 1/4
Gen. Elec., com.	168 - 170 1/4	Va. I. C. & Coke, com.	51 - 59
Gr. No. Ore Cert, com.	35 - 37 1/4	Warwick, com.	9 1/4
Gulf States Steel, com.	126 - 130	Westing. Elec., com.	52 - 53 1/4
Harb-Walk. Refrac., com.	124 - 125		
Harb-Walk. Refrac., pref.	108		
Int. Harv. of N. J., com.	120 - 122		

Dividends

The Hoover Steel Ball Company, monthly 5 per cent, payable Feb. 1. A stock dividend of 100 per cent is being made and the same dividend will be paid on this increased issue.

The Stewart-Warner Speedometer Company, quarterly, 1 1/2 per cent, payable Feb. 15.

The Dominion Bridge Company, quarterly, 2 per cent, and extra, 2 per cent, payable Feb. 15.

The Willys-Overland Company, quarterly, 75c. on the common stock, payable Feb. 1.

The Bethlehem Steel Corporation, quarterly, \$10 on the common stock and 1 1/4 per cent on the preferred stock, payable April 2.

The engineering firm of Bradley, Bruff & Labarthe, San Francisco, Cal., has placed a contract with the Bonnot Company, Canton, Ohio, for a Holbeck powdered coal preparing and distributing system for the new lead and silver refineries of the Bunker Hill & Sullivan Mining & Concentrating Company, Kellogg, Idaho. The Pressed Steel Car Company, McKees Rocks, Pa., has also placed a contract with the Bonnot Company for a similar system to supply powdered coal for its annealing and open-hearth furnaces and its forge, spring, rivet-making, plate-heating and miscellaneous order departments.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zeos 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 in. up to 100 in. wide, 3.60c. to 5c., base, net cash, 30 days, or $\frac{1}{2}$ of 1 per cent discount in 10 days, carload lots. Extras are:

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, $\frac{1}{4}$ in. thick, over 6 in. wide to 100 in. wide. Base

Lighter than $\frac{1}{4}$ in., to 3/16 in., up to 72 in. wide. .10

Lighter than $\frac{1}{4}$ in., including 3/16 in., over 72 in. to 84 in. .20

Lighter than $\frac{1}{4}$ in., including 3/16 in., over 84 in. to 96 in. .30

Lighter than $\frac{1}{4}$ in., including 3/16 in., over 96 in. to 100 in. .40

Lighter than $\frac{1}{4}$ in., including 3/16 in., over 100 in. to 102 in. .45

Lighter than 3/16 in., including No. 8, up to 72 in. wide. .15

Lighter than 3/16 in., including No. 8, over 72 in. to 84 in. .25

Lighter than 3/16 in., including No. 8, over 84 in. to 96 in. .35

Lighter than No. 8, including No. 10, up to 60 in. wide. .30

Lighter than No. 8, including No. 10, over 60 in. to 64 in. .35

Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered $\frac{1}{4}$ in.

Over 72 in. must be ordered $\frac{1}{4}$ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.

Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.

Over 72 in., ordered weight 3/16 in., take No. 8 price.

Over 72 in., ordered weight No. 8, take No. 10 price.

	Cents per lb.
Over 100 in. to 110 in. inclusive.	.05
Over 110 in. to 115 in. inclusive.	.10
Over 115 in. to 120 in. inclusive.	.15
Over 120 in. to 125 in. inclusive.	.25
Over 125 in. to 130 in. inclusive.	.50
Over 130 in.	1.00

	Cents per lb.
Universal plates 80 ft. long up to 90 ft. long.	.05
Universal plates 90 ft. long up to 100 ft. long.	.10
Universal plates 100 ft. long up to 110 ft. long.	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive. .25

Lengths under 2 ft. to 1 ft. inclusive. .50

Lengths under 1 ft. .1.55

Circles 3 ft. in diameter to 100 in. .30

Circles over 100 to 110 in. (width extra) .30

Circles over 110 to 115 in. (width extra) .40

Circles over 115 to 120 in. (width extra) .40

Circles over 120 to 125 in. (width extra) .55

Circles over 125 to 130 in. (width extra) .80

Circles over 130 in. (width extra) .1.30

Circles under 3 ft., to 2 ft., inclusive. .55

Circles under 2 ft., to 1 ft., inclusive. .80

Circles under 1 ft. .1.85

Half circles take circle extras.

Sketches not over four straight cuts, inc. straight taper .10

Sketches having more than four straight cuts. .20

Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, \$75 to \$80.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed,

\$2.95; galvanized, \$3.65. Galvanized barb wire and staples, \$3.85; painted, \$3.15. Wire nails, \$3. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 29, 1916, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$	57	30 $\frac{1}{2}$	$\frac{1}{4}$ and $\frac{1}{2}$	46	19
$\frac{1}{2}$	61	46 $\frac{1}{2}$	$\frac{3}{4}$	47	20
$\frac{3}{4}$ to 3.	64	50 $\frac{1}{2}$	$\frac{1}{2}$	51	33
			$\frac{3}{4}$ to 1 $\frac{1}{2}$	54	40
Lap Weld			Butt Weld		
2	57	44 $\frac{1}{2}$	1 $\frac{1}{4}$	40	25
2 $\frac{1}{2}$ to 6	60	47 $\frac{1}{2}$	1 $\frac{1}{2}$	46	32
7 to 12	57	43 $\frac{1}{2}$	2	47	33
13 and 14	47 $\frac{1}{2}$		2 $\frac{1}{2}$ to 4	49	36
15	45		4 $\frac{1}{2}$ to 6	49	36
			7 to 12	48	35
Reamed and Drifted			Butt Weld, extra strong, plain ends		
1 to 3, butt.	62	48 $\frac{1}{2}$	$\frac{1}{4}$ to 1 $\frac{1}{2}$, butt.	49	32
2, lap.	55	42 $\frac{1}{2}$	1 $\frac{1}{4}$, lap.	35	19
2 $\frac{1}{2}$ to 6, lap.	58	45 $\frac{1}{2}$	1 $\frac{1}{2}$, lap.	41	26
			2, lap.	42	27
			2 $\frac{1}{2}$ to 4, lap.	45	30
Lap Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
2	55	42 $\frac{1}{2}$	$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$	46	29
2 $\frac{1}{2}$ to 4	58	46 $\frac{1}{2}$	$\frac{1}{2}$	51	38
4 $\frac{1}{2}$ to 6	57	45 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$	55	40
7 to 8	53	39 $\frac{1}{2}$			
9 to 12	48	34 $\frac{1}{2}$			

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4 $\frac{1}{2}$ in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 $\frac{1}{2}$ in.	31
1 $\frac{1}{4}$ and 2 in.	43
2 $\frac{1}{4}$ in.	40
2 $\frac{1}{2}$ and 2 $\frac{3}{4}$ in.	46
3 and 3 $\frac{1}{4}$ in.	46
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	46
5 and 6 in.	45
7 to 13 in.	42
1 $\frac{1}{2}$ in.	23
1 $\frac{1}{4}$ and 2 in.	35
2 $\frac{1}{4}$ in.	32
2 $\frac{1}{2}$ and 2 $\frac{3}{4}$ in.	38
3 and 3 $\frac{1}{4}$ in.	43
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	44
5 and 6 in.	37
7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1 $\frac{1}{4}$ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment; on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	Cents per lb.
Nos. 3 to 8	4.06 to 4.25
Nos. 9 to 12	3.75 to 4.00
Nos. 13 to 16	3.85 to 4.10
No. 17 and lighter gages are based on \$4.50 per 100 lb. for No. 28 Bessemer black sheets.	

Box Annealed Sheets, Cold Rolled	Cents per lb.
Nos. 17 to 21	4.30 to 4.55
Nos. 22 and 24	4.35 to 4.45
Nos. 25 and 26	4.40 to 4.65
No. 27	4.45 to 4.70
No. 28	4.50 to 4.75
No. 29	4.55 to 4.80
No. 30	4.65 to 4.90

Galvanized Sheets of Black Sheet Gage	Cents per lb.
Nos. 10 and 11	5.25 to 5.75
Nos. 12 to 14	5.35 to 5.85
Nos. 15 and 16	5.50 to 6.00
Nos. 17 to 21	5.65 to 6.15
Nos. 22 and 24	5.80 to 6.30
Nos. 25 and 26	5.95 to 6.45
No. 27	6.00 to 6.50
No. 28	6.25 to 6.75
No. 29	6.40 to 6.90
No. 30	6.55 to 7.05

Tin Mill Black Plate	Cents per lb.
Nos. 15 and 16	4.05 to 4.20
Nos. 17 to 21	4.10 to 4.25
Nos. 22 to 24	4.15 to 4.30
Nos. 25 to 27	4.20 to 4.35
No. 28	4.25 to 4.40
No. 29	4.30 to 4.45
No. 30	4.30 to 4.45
Nos. 30 $\frac{1}{2}$ and 31	4.35 to 4.50

Metal Markets

The Week's Prices

		Cents Per Pound for Early Delivery			
Copper, New York		Tin		Lead	
		Electro- lytic	New York	New York	St. Louis
Jan.	Lake				
17.	29.25	29.25	45.00	7.62½	7.50
18.	29.50	29.50	45.50	7.75	7.62½
19.	29.50	29.50	45.37½	7.75	7.62½
20.	29.50	29.50	7.75	7.62½
22.	30.50	30.50	45.50	7.75	7.62½
23.	31.00	31.00	45.50	7.75	7.62½

NEW YORK, Jan. 24, 1917.

Copper is higher but prices are nominal in view of the very little metal offered. Tin has advanced under uncertainty as to supplies. Lead is almost unobtainable for early delivery. Spelter is quiet but has a firmer tone. Antimony is higher.

New York

Copper.—The market presents a remarkable aspect for the reason that it is next to impossible to get sellers to quote for deliveries in the first half of the year. The first quarter is sold up tight, and it would be difficult to say where metal might be procured for such delivery. There is some inquiry for May and June, and it is probable that small lots of electrolytic might be had at 29c. to 29.50c. For the third quarter about 27.50c. to 28c. is quoted. No business for the fourth quarter has come to light. The condition of the market is illustrated by the failure of a manufacturer to buy fairly prompt copper last week, despite the fact that he approached about 15 sellers, including both producers and second hands, all of whom refused to name a price for delivery. The situation is attributed to the possibility of the Entente Allies placing a large order for last half delivery, which, in the opinion of sellers, will surely send prices upward again. Lake copper is nominally at the same level as electrolytic. The exports this month, including yesterday, total 18,829 tons. Cable quotations from London have been very irregular in the past week, but one received yesterday places spot electrolytic at £141.

Tin.—Spot supplies are scarce, and the situation is made worse by the irregularity in the receipt of cable messages, which leaves both dealers and consumers in doubt as to what is happening in London. They have been both nervous and cautious. Meanwhile, prices have advanced until the quotation for spot Straits yesterday was 45.50c., New York. On one or two days of the week the market was fairly active, this being true Jan. 17, and again yesterday, when between 250 and 300 tons changed hands, only a few buyers and sellers figuring in the deals. Banca tin soon to arrive is quoted at 43.75c. to 44c. The arrivals this month total 2650 tons, and there is afloat 3558 tons.

Lead.—The market is extremely strong, and in some respects resembles that in copper, inasmuch as buyers cannot get specific prices or deliveries. A great deal of business has been turned down. Delays in transportation have caused a serious reduction in manufacturers' stocks, and the latter have entered the market only to be disappointed. Large quantities are en route, and the situation will be relieved as soon as these get through. In the meantime, prompt lead is quoted at 7.75c., New York, and over, and 7.62½c., St. Louis, and over. The exports this month, including yesterday, total only 937 tons. A cable from London yesterday gave the price of spot metal in that city as £30 10s., which is unchanged from the last cable.

Spelter.—January prime Western is quoted around 9.87½c. to 10c., St. Louis, and about 25 points higher at New York. February is around 9.75c., St. Louis, and March is about 9.50c. Brass special commands a premium from 1c. to 1½c., and has been sold this week at 11c. for January delivery in central New York. Second quarter prime Western is around 9c., New York. The producers are evidently expecting the Entente Allies to make heavy purchases, and in any event they

expect that the market will rally by the end of the month. The exports this month, including yesterday, total 4367 tons. The London quotation for spot, as cabled yesterday, is £47.

Antimony.—Under a fair demand, quotations have advanced, and wholesale lots command 15c., duty paid, while on jobbing lots up to 16.50c. has been paid. In this metal also spot supplies are not large, and it is predicted that quotations will go higher, partly for the reason that some of the smaller Chinese refiners are no longer active.

Aluminum.—The market is easier at 56c. to 60c. for No. 1 virgin aluminum, 98 to 99 per cent pure.

Old Metals.—The market is stronger. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	28.50 to 29.50
Copper, heavy and wire.....	27.00 to 28.00
Copper, light and bottoms.....	24.00 to 25.00
Brass, heavy.....	17.50 to 18.00
Brass, light.....	17.50 to 18.25
Heavy machine composition.....	23.00 to 24.00
No. 1 yellow rod brass turnings.....	17.50 to 17.75
No. 1 red brass or composition turnings.....	18.00 to 19.00
Lead, heavy.....	6.875
Lead, tea.....	6.50
Zinc.....	7.50 to 8.25

Chicago

JAN. 22.—A firm market prevailed throughout the week for all of the metals, with advancing prices. Scarcity of metal for early delivery and a considerable short interest contributed strength to the situation. We quote: Casting copper, 29c.; Lake copper, 31c.; tin, carloads, 46c., and small lots, 48c.; lead, 7.60c. to 7.80c.; spelter, 9.87½c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 17c. to 18c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 19.50c.; yellow brass, 14.50c.; lead pipe, 5.75c.; zinc, 5.5c.; pewter, No. 1, 25c.; tinfoil, 31c. block tin pipe, 36c.

St. Louis

JAN. 22.—Conditions were somewhat improved the past week. On carload lots the quotations to-day were: Lead, 7.65c. bid and 7.75c. asked; spelter, 10c. Less than carload lots: Lead, 7.85c.; spelter, 11c.; tin, 48.50c.; Lake copper, 31c.; electrolytic copper, 30.5c.; antimony, Asiatic, 17c. In the Joplin district zinc blende advanced \$11 per ton on the top grades which sold up to \$86, with a range down to \$70. Calamine was steady at \$45 to \$50. Lead ore was slightly firmer, with the top figure \$91.50. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9.50c.; heavy yellow brass, 12c.; heavy red brass and light copper, 18c.; heavy copper and copper wire, 19c.; pewter, 25c.; tinfoil, 33c.; zinc, 5.50c.; lead, 5.50c.; tea lead, 3.50c.

The Spelter Industry in 1916

Commenting on the spelter statistics for 1916, the *Engineering and Mining Journal* says that while at the beginning of the year an estimated producing capacity of 800,000 tons was foreseen, the year's total of 672,000 tons fell far short of that. Even in the fourth quarter, which showed the largest rate of production, it was less than 750,000 tons per year. But quarter by quarter, the output increased and the jump from the third to the fourth was the greatest. At the end of the year, although nearly 20,000 retorts were idle, new plants with about 14,000 retorts were under construction. Stocks of spelter in producers' hands were a little larger at the close of 1916 than at the beginning. In accounting for the failure of production to come up to expectations, it is stated that in many cases new plants were not completed as rapidly as calculated and the output per retort was diminished by a falling off in metallurgical extraction.

Copper production in the United States in 1916 is estimated at 1,941,900,586 lb. by the *Engineering and Mining Journal*. Zinc output is put at 672,300 net tons; nickel at 61,675,438 lb., and lead at 583,498 net tons.

Advances and Strikes

The J. N. LaPointe Company, New London, Conn., has announced an increase of wages of 10 per cent to all employees.

The Max Ams Machine Company, Bridgeport, Conn., has brought suit, asking \$5,000 damages, against Lodge No. 30, International Association of Machinists, for alleged losses caused by intimidation, assault and picketing about its plant. The case is being tried in the Superior Court in Bridgeport, and is exciting wide interest.

An unsuccessful effort was made last week by the Lalance & Grosjean Agate Mfg. Company to settle the strike in its plant at Woodhaven, Long Island, by inviting all the men to return to work on the old terms. It had been reported to the company that the strikers were getting low in funds. The men refused, and are still holding out for a 50-hr. week, an increase of 10 per cent in the wages of the week workers, 15 per cent in the case of the pieceworkers, and the reinstatement of two discharged workmen.

Workmen in the three chain works at Lebanon, Pa., have been called out because of the refusal of the manufacturers to grant the demand for increased wages made by the National Association of Chain-makers. The Lebanon manufacturers declare that they cannot grant the demand, which calls for an increase of 40 to 60 per cent.

George M. Verity, president American Rolling Mill Company, Middletown, Ohio, has notified all employees of the company that a blanket life insurance policy has been taken out in the Equitable Life Assurance Society of America covering each of them for a year's salary in the event of death from any cause while in the company's employ. The total sum is not to exceed \$2,400. To be eligible, the employee must have been in the company's service one year or more. The entire cost is borne by the company, and is in addition to any compensation to which the employee may be entitled under the present Ohio compensation act. The company has two large mills at Middletown and a third at Zanesville, and employs a total of about 5500 men.

The Evansville Stove Works, the Crescent Stove Works and the Advance Stove Works at Evansville, Ind., have each increased the wages of their employees.

The Orton-Steinbrenner Company, Huntington, Ind., operating a foundry and machine shop, at its annual meeting announced a bonus of \$65,000, almost 50 per cent of the wages paid employees for 1916, "because of their loyalty to the company, a willingness to work hard, to work overtime and to be 'on the job' continuously." The management claims that the plant has turned out more machinery to the foot of floor space than any other factory in the country.

The Columbian Enameling Company, Terre Haute, Ind., which distributed \$8,000 among its employees at Christmas, 1915, announces a bonus this year of 10 per cent monthly on wages.

At the plant of the Union Sanitary Mfg. Company, Noblesville, Ind., 80 molders struck Jan. 16 because of a disagreement over loss of castings, the company having announced that molders must stand all losses from defective work. Its principal line is bathtubs.

The Vulcan Plow Company, Evansville, Ind., has increased wages 10 per cent and established an 8-hr. schedule.

The strike at Portland, Ore., remains unsettled. The Willamette Iron & Steel Works and the Northwest Steel Company, the two concerns affected, are running with a portion of their usual forces. At the beginning of the strike the Seattle unions ordered their men not to handle open-shop material originating in Portland, but this order has been rescinded. The main point upon which the strike hinges is the open shop.

Machinists employed at the plant of the United States Automatic Company, Amherst, Ohio, have been given \$25,000 in bonuses. Men who had been with the company three years received a bonus of 5 per cent, and those more than three years 6 per cent.

To Standardize Screw-Thread Tolerances

WASHINGTON, Jan. 23, 1917.—A bill providing for the appointment of a commission to standardize screw-thread tolerances has been introduced in the House by Representative Tilson of Massachusetts and referred to the Committee on Coinage, Weights and Measures. The commission is to consist of five members, one of whom shall be an officer of the army and another an officer of the navy, while three are to be appointed by the Secretary of Commerce, one to be the director of the Bureau of Standards and the other two chosen from nominations made by the American Society of Mechanical Engineers or by the joint conference committee on engineering standards of the national engineering societies. The commission is to ascertain and establish a standard or standards for screw-thread tolerances, which shall be submitted to the Secretary of War, the Secretary of the Navy and the Secretary of Commerce for their approval. Such standards, when accepted and approved, "shall be adopted and used in the several manufacturing plants under the control of the War and Navy departments and so far as practicable in all specifications for screw-threads in proposals for manufactured articles, parts or materials to be used under the direction of these departments." The Secretary of Commerce is required to promulgate the standards and cause them to be published as a public document. The members of the commission are to serve without compensation. An unusual feature of the measure authorizes the commission to issue subpoenas for and to compel the attendance of witnesses, to require the production of books, papers and other evidence, to administer oaths and "to examine witnesses touching any matter within the jurisdiction of the commission."

While the general objects of the bill are approved by the leading engineering societies, there has been some difference of opinion as to whether they can best be attained by the legislation proposed by Mr. Tilson. In view of the present congested condition of the legislative docket in Congress it will hardly be possible to pass the bill at this session in the face of any serious opposition. Should all the interests affected unite in urging its enactment, however, it could probably be put through either as an independent measure or as an amendment to an appropriation bill.

W. L. C.

Labor's Loss Through Sickness

The direct money loss of sickness to the workmen of the country figures out over \$800,000,000 annually on the basis of 30,000,000 wage earners averaging \$2 per day wage. Such a calculation was made by Dr. Loyal A. Shoudy, chief surgeon, Bethlehem Steel Company, South Bethlehem, Pa., in a paper presented at the recent safety conference held under the auspices of the Pennsylvania labor department at Harrisburg, Pa. In his argument for physical examination of employees and wide medical supervision in industrial establishments, he mentioned government statistics to the effect that the average worker loses about nine days per year by sickness alone. Adding \$1 per day for medical supervision to the daily wage loss, he arrives at the figure stated.

The Texas Rolling Mill Company, Fort Worth, Tex., is installing open-hearth furnaces, a 22-in. bar and billet mill and an 8-in. hoop and cotton-tie train. The complement of rolls for the hoop and cotton-tie train was designed by the Heinle Company, metal-rolling engineer, Crafton, Pittsburgh, Pa. The groove arrangement for the cotton-tie train will have an entirely new means for distributing the wear. The Texas Rolling Mill Company intends to replace the steam engines on the present roll trains with motors, operating the plant entirely by electricity in the future.

The third annual safety exposition in Ohio, under the auspices of the Industrial Commission of that State, of which Victor T. Norman is director of safety, will be held at Memorial Hall, Columbus, Ohio, March 6 to 10.

PERSONAL

William B. Dickson, vice-president and treasurer Midvale Steel & Ordnance Company, has been selected by Governor Edge of New Jersey to head a commission of five to investigate conditions at the New Jersey State prison at Trenton.

W. W. Taylor has resigned as vice-president and general manager of the Oriskany Ore & Iron Corporation, Lynchburg, Va., and will engage in other business.

Charles E. Carpenter, vice-president Allied Machinery Company of America, a subsidiary of the American International Corporation, 120 Broadway, New York, has returned from Europe.

C. E. Bertie, who since 1906 has been almost continuously connected with the sales department of Rogers, Brown & Co., has resigned to become assistant to John B. Newton, president Virginia Iron, Coal & Coke Company, Roanoke, Va., entering upon his new duties Monday, Jan. 22. His first connection with the iron business was in 1904 when he entered the employ of the Chapman Iron, Coal & Coke Company, Goshen, Va., gaining experience in the shipping, accounting and purchasing departments of that company. Subsequently he was for a short time with the shipping department of the Northern Iron Company, Standish, N. Y. In 1911 and 1912 he did some special work for the Roanoke Gas & Water Company, Roanoke, Va. While with Rogers, Brown & Co., he was connected with their sales offices at New York, Chicago and Philadelphia. Since 1914 he has been in the last-named city as assistant to George R. Sullivan, manager of the Philadelphia territory.

George L. Collard, general superintendent of the three blast furnaces of the Shenango Furnace Company, Sharpsville, Pa., has been elected president of the Chamber of Commerce of Sharon, Pa. He succeeds in this position Severn P. Ker, who is president of the Sharon Steel Hoop Company.

C. D. Marshall, McClintic-Marshall Company, Pittsburgh, was elected president of the Bridge Builders' and Structural Society at its annual meeting held at the Waldorf-Astoria, New York City, Jan. 12.

Herbert DuPuy, chairman and president of the Crucible Steel Company of America, Pittsburgh; J. W. Daugherty, president of the Pittsburgh Crucible Steel Company, and William G. O'Malley, manager of the latter company's Midland plant, have been elected directors of the Midland Savings & Trust Company, Midland, Pa.

W. L. Batt has been made sales manager of the Hess-Bright Mfg. Company, Philadelphia, and will have entire charge of its sales after Feb. 1. He has been connected with the company since its early days.

J. H. Foster, vice-president of the Hydraulic Pressed Steel Company, Cleveland, Ohio, has been elected a director of the Guardian Savings & Trust Company, Cleveland.

Harry Robinson, superintendent of the electric department of the Worth Brothers plant of the Midvale Steel & Ordnance Company at Coatesville, Pa., has resigned and will go to the new Worth plant to be built at Claymont, Del.

M. A. Purvin has been appointed manager of the Chicago office of the United Smelting & Aluminum Company, Inc., New Haven, Conn., which will be located at 959 Monadnock Building.

William Forsstrom has resigned the position of chief engineer of the LaBelle Iron Works, Steubenville, Ohio, to accept a similar position with the Youngstown Sheet & Tube Company, Youngstown. H. H. Roberts, assistant chief engineer, has been appointed to succeed Mr. Forsstrom.

H. D. Westfall, vice-president and general sales manager of the LaBelle Iron Works, Steubenville, Ohio, has gone to the Pacific coast on a business trip.

J. G. Rohrman, sales manager of the Atlanta, Ga.,

office of the Youngstown Sheet & Tube Company, has resigned to accept a responsible sales position with the Allegheny Steel Company, Brackenridge, Pa.

W. H. McKenna, vice-president Vanadium Alloys Steel Company, Pittsburgh, has departed on an extended business and pleasure trip to the Hawaiian Islands, China and Japan.

F. B. Longanecker, who recently resigned his position with the Enterprise Mfg. Company, Columbiana, Ohio, is now connected with the Cleveland offices of the Vanadium Alloys Steel Company as traveling salesman. The Cleveland office of the company is located in the Hotel Statler and is in charge of J. H. Taylor.

J. G. Blunt, who was recently appointed mechanical engineer of the American Locomotive Company, with headquarters at Schenectady, N. Y., became a draftsman in 1897 at the Brooks Locomotive Works, Dunkirk, N. Y. Previously he had spent four years as machinist and draftsman at various plants, after taking the mechanical engineering course at Ann Arbor, Mich. He has been continuously in the engineering department of the American Locomotive Company or its predecessors. When the engineering work of all the company's plants was consolidated at Schenectady, Mr. Blunt was transferred to that point as engineer of the drafting department and later was appointed superintendent of the general drawing room.

L. E. Thomas, who has been general manager, has been made a vice-president of the Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., and his title is now vice-president and general manager.

Robert H. Clymer, who has been manager of the scrap yard of Luria Brothers & Co., at Lebanon, Pa., has been placed in charge of their business at Reading.

J. M. Shenk has been elected president of the Lebanon Chain Works, Lebanon, Pa., to succeed Thomas Evans, elected secretary and treasurer. C. F. Zimmerman, treasurer of the Lebanon County Trust Company, was made vice-president. New directors elected are Eli Attwood, S. P. Light and H. G. Louser of Lebanon and H. J. Haden, Reading.

Joseph B. Weaver, superintendent of hull construction of the Newport News Shipbuilding & Drydock Company, Newport News, Va., has resigned to become vice-president and general manager of the Harlan & Hollingsworth Corporation, Wilmington, Del.

H. Perry Phelps has been named plant engineer by the Newport News Shipbuilding & Drydock Company, Newport News, Va., a position recently created. He will have supervision of the plant machinery, including the installation of a large amount of new machinery for which the company recently made an appropriation.

At the annual meeting of the Rochester Bridge & Structural Company, Rochester, Ind., A. L. Deniston, former secretary and general manager, was elected president; Eugene Hunter, vice-president; H. S. Miller, treasurer and Guy Barr, secretary. The business of 1916 amounted to \$500,000, an increase of nearly \$200,000 over 1915.

W. J. Radcliffe, heretofore vice-president and general manager of the E. A. Kinsey Company, Cincinnati, has been elected president and general manager of the company.

H. H. Whiting has resigned as president and director of the Acme Steel Company, Akron, Ohio, and the vacancy on the directorate has been filled by the election of George E. Probert. A new president has not yet been elected. C. A. Spencer, the secretary and treasurer, and John H. Davis, the superintendent, are actively in charge.

G. A. Dow and Wallace Dow, of the Dow Pump & Diesel Engine Company, Alameda, Cal., are spending this month in Eastern manufacturing centers.

William C. Frye, president Chain Belt Company, Milwaukee, started Jan. 18 on a three months' tour of Japan, China and the Hawaiian Islands.

Henry Harnischfeger, president Pawling & Harnischfeger Company, Milwaukee, tendered a banquet

to the department managers, superintendents and office force at the Hotel Pfister on Saturday evening, Jan. 20.

The Wausau Foundry & Machine Company, Wausau, Wis., has elected the following officers: President, J. M. Howarth; vice-president, William Anderson; secretary, Karl Kraatz; treasurer, Albert Kraatz.

At a meeting of the board of directors of the American Locomotive Company, Jan. 17, the following officers were appointed, effective Feb. 1: Columbus K. Lassiter, vice-president in charge of manufacture; Harry B. Hunt, assistant vice-president in charge of manufacture; James D. Sawyer, vice-president in charge of sales; Joseph Davis, vice-president and comptroller.

R. K. Stockwell, who has been chief engineer and superintendent of construction for the Braden Copper Company at Raucaque, Chile, for the past five years, will soon open a Western engineering and sales office of the Robins Conveying Belt Company in Salt Lake City, Utah.

Glen Christopher, for some time connected with the sales department of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has been made district sales manager of its Atlanta, Ga., office, succeeding J. G. Rohrman, resigned.

George Giffault, who has been long connected with Fitz, Dana & Brown, 441 Pearl Street, New York, has joined the staff of the North American Copper Company, 52 Vanderbilt Avenue, New York.

Louis S. Hall, 1607 Kresge Building, Detroit, has been appointed sales agent for the Steel Improvement & Forge Company, Cleveland, and will cover the State of Michigan.

Charles J. Graham, president Graham Nut Company, Pittsburgh, has been elected a director of the Carbo-Hydrogen Company of America.

Barton R. Shover, formerly of the Brier Hill Steel Company, and latterly of the Tata Iron & Steel Company, has opened offices in the Diamond Building, Pittsburgh, as consulting electrical and steam engineer for the application of power to iron, steel and other industrial plants.

L. C. Parrott, for four years assistant purchasing agent of the Standard Parts Company, formerly the Standard Welding Company, Cleveland, has resigned, to take effect Jan. 31. He has accepted the position of purchasing agent of the Otis Steel Company, Cleveland, and will take up his new duties Feb. 1.

Industrial Education Convention

The National Society for the Promotion of Industrial Education will hold its tenth annual convention at the Hotel Claypool, Indianapolis, Ind., Feb. 21 to 24, inclusive. A sectional meeting on trade and technical schools is scheduled for Friday afternoon, Feb. 23, and simultaneous sessions on industrial and vocational schools. An employment managers' conference is to take place immediately preceding the industrial educational meeting, this meeting being scheduled for Wednesday afternoon and Wednesday evening, Feb. 21.

Among the subjects announced in the advance program for this conference are the following: "The New Profession of Handling Men"; "How the Fore River Shipbuilding Company Determined the Kind of Department It Needed and How It Was Put into Operation"; "Methods of Determining the Cost of Labor Turnover," this to be taken up by Boyd Fisher, vice-president Executives Club, Detroit Board of Commerce; "Authority Which Should Be Given the Employment Manager," and "Employment Departments from the Viewpoint of the Employee."

The Lima Metals Foundry Company, Lima, Ohio, recently incorporated with a capital stock of \$15,000 to make brass, bronze and aluminum castings, has elected officers as follows: A. H. Werkman, president; J. R. Racine, vice-president; W. J. Noonan, secretary and treasurer.

OBITUARY

PHILIP G. FOSDICK, president Cincinnati Gear Company, Cincinnati, died Jan. 22 at Miami, Fla., after a lingering illness, aged 59 years. He entered the machine-tool business with the former Lodge & Davis Machine Tool Company, later organizing the Fosdick Machine Tool Company, but disposed of his interest in that company 10 years ago. He was prominent in public life, having served in the State Legislature and as director of public service, Cincinnati. He was a member of the Business Men's Club, Queen City Club, Chamber of Commerce, Automobile Club and other business and civic organizations. He leaves his widow and three children.

COL. HERBERT HUGHES, director of the well-known steel firm of William Jessop & Sons, Ltd., Sheffield, England, died last week, aged 64 years. He was an eminent lawyer, was lord mayor of Sheffield in 1905-1906, and was prominently associated with the volunteer forces in England, having acted as brigadier-general. He was at one time a member of the Advisory Board at the War Office. Colonel Hughes represented the British Government at the International Conference on Trademarks, held at Washington, D. C., a few years ago. He also represented that government in a similar capacity at conferences held in Berlin and Madrid.

JAMES D. FOOT of Rye, N. Y., died Jan. 20 at Eagle Springs, N. C., from injuries received by the accidental discharge of his shotgun. He was quail hunting. He was born in Springfield, Mass., and was 66 years old. Mr. Foot was formerly a manufacturer, and retired some years ago. He was a director of the Foot Mfg. Company, Jersey City; Passaic Print Works, Passaic, N. J.; Positive Lock Washer Company, Newark, N. J. He was a member of the Hardware and New York Athletic Clubs of New York City. He leaves his widow, a son, and a daughter.

CAPT. ELTON A. SMITH, president H. B. Smith Woodworking Machine Company, Smithville, N. J., died Jan. 16 at his home in Mount Holly, N. J., aged 69 years. He was the son of Hezekiah B. Smith, founder of the company. Besides his interests in the machine company, Captain Smith was president of the Savannah Lighterage & Transportation Company. He leaves his widow and seven children.

JAMES DOUGLAS STREET, one of the oldest dealers in mill supplies, etc., in St. Louis, died Jan. 20, aged 63 years. He had been in business for himself since 1877, and leaves a son, J. Clark Street, as his successor. He was a member of the Noonday and St. Louis clubs, director of the Mechanics America, the Mercantile National and the Mercantile Trust banking institutions, and had other heavy interests.

SOLOMON M. CANTROVITZ, president Western Rawhide & Belting Company, Milwaukee, died Jan. 17, aged 59 years. He leaves his widow, who is a member of the Milwaukee Board of School Directors.

German Steel Shipments Still Declining

Shipments of the German Steel Works Union continue to decline, having been only 212,675 metric tons in November, 1916, the lowest of any month since August, 1914, when they were only 94,984 tons. In October and September, 1916, they were 230,544 tons and 244,212 tons respectively. May was the high month in 1916, with 311,620 tons. The November shipments were made up of 67,880 tons of semi-finished steel, 82,099 tons of railroad material and 62,696 tons of shapes. Shipments in November, 1915, were 241,750 tons.

The Noble Electric Steel Company, San Francisco, recently shipped to Philadelphia 50 tons of ferrochrome, the first such shipment from its plant at Heroult, Cal.

BESLY MANAGERIAL ENERGY

Quickly Overcoming a Fire Handicap Which Might Have Taken Days or Weeks

The building which contained the general sales offices and store of Charles H. Besly & Co., 118 to 124 North Clinton Street, Chicago, was destroyed by fire early on the morning of Saturday, Jan. 13. How the company, through the energy of its president, Edward P. Welles, minimized the interruption to its business by immediately establishing temporary quarters, is instructive. He reached the building at 7.55 a. m., shortly after he had been notified of the fire, and found nothing left but the side walls. Ten streams of water were being played on what was left of the building, the second and third floors having dropped to the first. At 8.20 a. m. Mr. Welles had arranged for occupancy of the first floor and basement of the Ruprecht Building, having 100 ft. frontage on Randolph Street and 150 on Jefferson Street, and at 9 a. m. telephones were being installed. Neighbors loaned four or five desks.

On Jan. 14 access was had to the company's vaults and the records were found to be intact, and on the morning of Jan. 15 the company's office forces of 50 persons were at work with new desks and office equipment, and orders were being filled with but slight delay. Mr. Welles and his associates were gratified by the manner in which the company's competitors offered the use of their stocks, and many delays in the fulfillment of orders were thus avoided pending the arrival of new goods from its plants at Beloit, Wis., and elsewhere. The greatest delay was in fabricating metals, inasmuch it was necessary to wait for new machinery.

The company will rebuild on the old site, architects already having the plans under way. Some of the Western newspapers stated that the fire was probably of incendiary origin, for the reason that the company was selling brass and copper to the Russian Government. Mr. Welles emphasizes that the fire was not incendiary, and that his company does not manufacture or sell munitions. It sells tools and supplies, brass, copper and other metals, and in the course of its jobbing business it has shipped to countries all over the world.

Electric Furnace Company to Move to Cleveland

Financial arrangements have been concluded which will result in the removal of the Electric Furnace Company of America from Alliance, Ohio, to Cleveland, and a site for a plant is now being looked for. In case a suitable building is not found a new plant will be erected. The company has been reorganized with a capital of \$150,000 in preferred stock and \$200,000 in common stock. T. F. Baily, who has been at the head of the company, is president of the reorganized company. F. T. Cope is vice-president and W. G. Tousley is secretary and treasurer. The company has been building for some time in Alliance the Baily electric furnaces for the heat treating of steel and for melting and annealing non-ferrous metals.

The Inland Steel Company, Indiana Harbor, Ind., has just placed in operation a battery of 44 Koppers by-product coke ovens. This completes the third order given by the Inland Steel Company for these ovens, the plant now consisting of 130 Koppers ovens with by-product and benzol recovery plants. The H. Koppers Company has completed 805 by-product coke ovens in the past 12 months. These ovens have a total carbonizing capacity of approximately 5,000,000 net tons of coal per year.

The American Iron & Steel Mfg. Company will hold a special meeting of its stockholders at its main office in Lebanon, Pa., Feb. 27, at 2.15 p. m., for the purpose of taking action on the proposed sale by the company of its franchises and all its property, which has been approved by the executive committee and board of directors, to the Bethlehem Steel Corporation.

Rogers, Brown & Co.'s Annual Sales Meeting

The annual meeting of managers and salesmen of Rogers, Brown & Co. was held at Cincinnati, Jan. 18 and 19. The first day was devoted to informal business discussions at the company's offices with luncheon at the Cincinnati Business Men's Club. In the evening the entire party was entertained at the Avondale residence of D. B. Meacham, and after dinner a vaudeville performance was given, staged by Standish Meacham, advertising manager of the firm, all of the performers being employees of the company.

Friday, Jan. 19, was spent in Detroit, where the party were guests of the Charcoal Iron Company of America. A get-together luncheon was served at the Detroit Athletic Club, and in the evening a dinner was given at the Detroit Club, followed by a theater party. On Saturday a visit was made to the Ford Motor Company's plant.

Those who attended were the following: D. B. Meacham, J. K. Pollock, R. D. Meacham, Standish Meacham, F. W. Miller, W. H. Knight, J. J. Hoff, F. W. Bauer, J. R. Houston, W. Ireton, H. Lammers, H. E. Turner and A. J. Wentworth, Cincinnati; H. Wilson and S. W. Hubbard, Cleveland; F. J. Waldo, W. T. Shepard and A. F. Stengel, Buffalo; A. A. Fowler, R. W. Clark and O. Arit, New York; T. A. Wilson and W. P. Cheney, Pittsburgh; H. W. Fernald, E. C. Maher and R. E. Blaze, Boston; A. B. Weaver, T. C. Calkins and E. L. Billingslea, Chicago; J. C. Mears, St. Louis; C. E. Bertie and G. E. Sullivan, Philadelphia.

Ohio Manufacturers' Annual Meeting

The Ohio Manufacturers' Association, at its annual meeting at Columbus, Ohio, Jan. 19, elected the following officers: President, C. B. McCoy, Coshocton; vice-presidents, John G. Battelle, Columbus, William K. Leonard, Piqua, and John Kirby, Jr., Dayton; secretary, Malcolm Jennings, Columbus; treasurer, George A. Archer, Columbus; general counsel, Daniel J. Ryan, Columbus. The Executive Committee is made up as follows: J. D. Cox, Jr., Cleveland; J. J. Dauch, Sandusky; Frank M. Baggs, Portsmouth; A. B. Jones, Akron; C. Wood Walter, Cincinnati; George W. Perks, Springfield; R. H. Jeffrey, Columbus; Charles R. Clapp, Toledo, and Charles E. Lozier, Toledo.

Recommendations were made for changes in the Ohio workmen's compensation law with the idea of still further diminishing the menace of litigation by injured employees, influenced by unscrupulous lawyers. It was further suggested that it be made clear that occupational diseases are not now covered.

U. S. Metal & Mfg. Company to Dissolve

The U. S. Metal & Mfg. Company, 165 Broadway, New York, is arranging to discontinue business. At a meeting of the directors Jan. 15 it was unanimously voted that the corporation should be dissolved. A special meeting of the stockholders is to be held Feb. 20 at Plainfield, N. J., to take the necessary action. The company has been in existence for 16 years, conducting a brokerage business in old iron and steel and also handling certain railroad supplies as manufacturers' agent. The president of the company, B. A. Hegeman, Jr., intends to continue in the railroad supply business, but no definite announcement can be made regarding the disposition of the other part of the company's activities until after the stockholders' meeting.

New Jersey Iron Mine to Be Operated

A new company has been formed to operate under lease the Beach Glen Iron Mines in northern New Jersey between Rockaway and Hibernia. The property has not been operated for 12 years and was last worked by the Wharton Steel Company. The new lease is understood to carry an option of purchase at \$300,000. The ore is of Bessemer quality. Cortland Nicoll, son of Benjamin Nicoll, is president of the mining company.

STEEL EXPANSION IN INDIA

Tata Iron & Steel Company Letting Important Contracts in the United States

The Tata Iron & Steel Company, in accordance with a report presented last year by C. P. Perin, 2 Rector Street, New York, its consulting engineer, is entering upon an extensive program of additions, which will considerably extend and diversify its output. H. M. S. Tuckwell, chief engineer of the company, with offices in London, is now in the United States engaged with Mr. Perin in placing contracts and completing details of the new construction. The company has made a large increase in its capital stock and has already contracted for one blast furnace of 550 tons daily capacity, a 90-in. plate mill, a sheet mill with an annual capacity of 60,000 tons of corrugated sheeting, a sheet bar and billet mill, a Morgan continuous merchant mill and a Morgan wire mill. The Morgan merchant mill is intended to roll from ordinary merchant sizes down to wire rods. The company will build now 100 by-product coke ovens of Wilputte design, to which will probably be added a benzol plant. It is quite probable that a fourth blast furnace will be added, with its requisite number of coke ovens.

Consuming Industries

The Tata Company is arranging with other manufacturers to establish at Sakchi (155 miles from Calcutta) a plant for the manufacture of tubes, which will buy its skelp and strips from the steel works. It is also, with the Burma Oil Company, planning for the establishment of a tin-plate plant at Sakchi, the tin-plate company buying its bars from the Tata Iron & Steel Company. The Burma Company, owner of the great Bawdwin zinc mines, is planning to erect at Sakchi a plant for the manufacture of 10,000 tons of spelter annually and about 20,000 tons of sulphuric acid. A large part of the acid will be used by the steel company in the manufacture of sulphate of ammonia. Other companies are contemplating locating their plants at Sakchi, one for the manufacture of enameled iron ware and another for the manufacture of railroad cars.

Contracts have already been let to the William B. Pollock Company, Youngstown, Ohio, for the plate work for the blast furnaces, mixer, etc., and also for the fabrication. The General Electric Company and the British Thomson Houston Company have the contract for the motors for the mills and cranes. Five locomotives have been ordered from the American Locomotive Company, Schenectady, N. Y.

A novel feature of this Tata extension is the manufacture in India of a large part of the mills that are to be installed. An additional machine shop is being built and machine tools have been ordered from England, to be ready for operation in the month of May. The Tata Company will cast all of its rolling mill housings, most of its rolls, and do all the smaller forgings.

Studies are now being made for a new blooming and rail mill by the Tata Company, with the idea of giving up a large part of the present rail-mill capacity to the rolling of structural steel and other specialties. The new rail mill is to be equipped to comply with the requirements of the British Government for the manufacture of munitions. All of the steel buildings for the new extensions are to be built at the company's own works out of material rolled at Sakchi.

The Tata Iron & Steel Company recently bought out the National Collieries Syndicate and acquired control of Jamadoba and a group of operating mines, which with its present properties will soon give an annual output of 750,000 tons. The company now buys a large part of its coking coal in the form of dust, there being a very limited market for this product.

Two firebrick companies are operating in India, one under the direction of Burn & Co., with an output of about 6,000,000 firebrick a year, but this company has not yet begun the manufacture of silica brick. Bird & Co. operate another plant for the manufacture of firebrick. The latter company has been experimenting and is now successfully manufacturing silica brick at its Kumardhubi Fire Clay and Silica Works.

A 1,500,000-Ton Pig-Iron Contract

Negotiations are on foot between the Tata Iron & Steel Company and Mitsui & Co. of Japan for the purchase of 1,500,000 tons of pig iron from the Sakchi furnaces to be delivered in equal installments over the next ten years. This will probably prove to be one of the largest pig-iron contracts on record.

Alan Wood Plans New Blast Furnace

The Alan Wood Iron & Steel Company, Philadelphia, is having plans prepared by Julian Kennedy, Pittsburgh, for a new blast furnace at Swedeland, Pa., which, when erected, will give the company three at that point. Its two furnaces now in operation have an annual capacity of 275,000 tons. Whether the new furnace will be constructed as an independent unit, or be operated as an alternate stack in connection with those already built, is not yet fully determined. Without the new furnace the company might encounter a shortage of iron after the completion of three open-hearth furnaces which are now being constructed at Ivy Rock, which is just across the Schuylkill River from the furnaces. The company is also installing an ore-handling plant which will be equipped with a crane of sufficient power to pick up a loaded freight car and empty it. Other improvements call for a number of workmen's dwellings.

Lake Superior Mining Institute to Meet at Birmingham

The 21st annual meeting of the Lake Superior Mining Institute will be held in the Birmingham, Ala., district, the institute having accepted invitations extended by the Tennessee Coal, Iron & Railroad Company and the Republic Iron & Steel Company. Members and guests assemble in Chicago on Saturday, March 10, and leave by special train at 11.30 p. m. Monday will be spent at Lookout Mountain, Chickamauga, and other battlefields around Chattanooga. Tuesday, Wednesday and Thursday will be taken up with the meeting at Birmingham and trips to the various mines, steel works, blast furnaces and other plants in the district, headquarters being at the Tutwiler Hotel. On the return trip Chicago will be reached at 11.30 a. m. Saturday, March 17.

Brier Hill Steel Company's Meeting

Contrary to expectations, no extra returns to stockholders were authorized at the annual meeting of the Brier Hill Steel Company, held in Youngstown Jan. 23. Instead, a surplus fund aggregating \$8,000,000 was established, besides a fund of \$1,500,000 for the payment of dividends in lean years, while in addition \$1,000,000 was charged off for depreciation. President W. A. Thomas stated that the company expects to maintain the common stock on a 14 per cent annual dividend basis. Earnings for 1916 approximated \$10,000,000. All the old officers were re-elected, and J. B. Kennedy was elected to the board of directors to succeed E. L. Ford.

Milton furnace of the Milton Iron Company, Wellston, Ohio, will be blown in Jan. 29 on high silicon foundry iron. The Domhoff-Joyce Company, Cincinnati, has been appointed exclusive sales agent.

The Donner Steel Company is blowing in the first of the two Niagara furnaces that were leased some months ago from the Tonawanda Iron & Steel Company, North Tonawanda, N. Y.

Navy Department Refuted by Shipbuilders

The Fairness of Recent Offers to Build Cruisers Brought Out Convincingly in a House Committee Hearing

WASHINGTON, Jan. 23, 1917.—The House Committee on Naval Affairs gave an extended hearing in the past week to representatives of the five shipbuilding companies with which the Secretary of the Navy has been negotiating for the construction of four battle cruisers. Representations made to the Naval Committee and published statements given out by Secretary Daniels have reflected so unfairly upon the shipbuilders that they have felt that both Congress and the people should have their side of the controversy. Those who appeared before the committee included Henry S. Snyder, vice-president Bethlehem Steel Company, which controls the Fore River Shipbuilding Company and the Union Iron Works; J. W. Powell, president Fore River Company; Henry S. Grove, president Cramp Ship and Engine Building Company; Samuel M. Knox, president New York Shipbuilding Company, and H. L. Ferguson, president Newport News Shipbuilding & Dry Dock Company.

Congress appropriated \$16,500,000 each for the four battle cruisers and provided in addition that the Secretary of the Navy might pay a bonus of 20 per cent for the expeditious construction of the four vessels, which would bring their cost up to a possible maximum of \$19,800,000 each. None of the private shipyards was able to submit an upset price for the construction of any of these vessels, but all four were covered by offers to build them at cost plus a small profit, variously stated at 10 per cent or such "reasonable profit" as the Federal Trade Commission might suggest. Following the opening of these bids Secretary Daniels undertook to secure an estimate from the shipbuilders of the probable cost of the vessels on the proposed cost-plus-profit basis and was advised that it would be not far from \$19,000,000 per cruiser. He then applied to the House Naval Committee for an appropriation of \$12,000,000, in addition to the \$6,000,000 heretofore allotted, for the purpose of equipping Government navy yards for the construction of the battle cruisers and other warships included in the preparedness program, at the same time attacking the shipbuilders for lack of patriotism and even hinting at collusion.

Navy Department Answered

At the hearing before the House Committee the shipbuilders denied with emphasis Secretary Daniels' charges and effectively refuted many of his statements. They emphasized existing conditions in all industrial lines and called attention especially to the difficulty of obtaining shipbuilding materials and the impossibility of securing a sufficient supply of skilled labor. They also made it clear that, in view of the present demand for construction in all the shipyards of the country, nothing but patriotism could induce a shipbuilder to offer to build a warship on anything like the terms upon which tenders have been made for all four of the battle cruisers.

President Grove told the committee that the Cramp yard would set aside one-third of its plant to work on one battle cruiser, but would permit the Government to supervise the accounting system employed and would accept a 10 per cent profit over and above the cost of materials, labor and overhead.

Speaking for the New York Shipbuilding Company, President Knox declared that his firm did not desire to undertake any Government work at this time and contemplated doing so only to assist the Navy Department.

President Ferguson took the Navy Department sharply to task for its attitude toward private shipbuilding companies and declared that this attitude was in large part responsible for the difficulties encountered. The battle cruisers present technical difficulties far

greater than those of any ships heretofore built. Ways of extra length, not called for by any other type of vessel, must be built to accommodate the cruisers, and no industrial corporation would be justified in locking up capital in such special facilities in view of the widely advertised policy of the Navy Department to equip the navy yards for the construction of as many warships as possible, leaving to the private yards only such vessels as the Government cannot build.

Government and Private Costs

Mr. Ferguson severely criticised the statements made by the naval authorities concerning the relative cost of construction in the navy yards and in the plants of private shipbuilders. The cost accounting systems of the navy yards, he declared, were so defective that the Navy Department did not know and could not ascertain the actual cost of building a warship. For this reason all comparisons with the bids presented by private shipyards were not only valueless but were exceedingly unfair to the private concerns. In this connection Mr. Ferguson made the interesting statement that, following the opening of the bids for the battle cruisers, his company had furnished the Secretary of the Navy an estimate of the cost of constructing one of the vessels, which was only \$300,000, or less than 2 per cent above a figure which the Secretary said he was willing to pay. This statement goes far toward refuting the oft-repeated charge that the shipbuilders are seeking to "rob" the Government.

In this connection the statement by President Grace of the Bethlehem Company, at a dinner given at the Manufacturers' Club, Philadelphia, Jan. 13, and published in the last issue of THE IRON AGE, was laid before the committee. The proposition of the Bethlehem company, that if the Government will build two of the battle cruisers in the navy yards the corporation will construct the other two "at the ascertained cost of building the ships in the Government yards without additional expense or commissions of any kind," made a deep impression on the committee, several members of which have since expressed the conviction that no evidence could be adduced that would show more clearly the good faith of the private shipbuilders.

There is good reason to believe that the hearing has left the members of the Naval Committee with an entirely different conception of the attitude of the shipbuilders of the country from that given by Secretary Daniels. Several members of the committee are openly advocating such increase in the appropriations for the four battle cruisers and the three scout cruisers, contracts for which have not yet been let, as will permit of their construction in the private yards. At the same time there is a general disposition in the committee to grant Secretary Daniels' request for an appropriation large enough to equip three or four yards for the construction of capital ships and three or four additional yards for the building of torpedo boat destroyers, submarines and small auxiliary vessels.

Expanding Navy Yards

The movement to expand the navy yards for construction purposes has received a considerable impetus during the past week by the publication of a preliminary report of a special commission of naval officers recently appointed by President Wilson. The commission was composed of Rear Admiral J. M. Helm, Chief Constructor W. L. Capps, Civil Engineer H. H. Rouseau, Capt. G. W. McElroy and Commander C. L. Hussey. Concerning the abandonment of certain of the navy yards, which has been strongly urged by several

of Secretary Daniels' predecessors, the commission finds "that it is unnecessary, undesirable and inadvisable to abolish at this time any existing navy yard or naval station within the continental limits of the United States."

An interesting feature of the report is the discussion of the suggestion that the lessons of the European war point to the desirability of concentrating construction facilities rather than of scattering them throughout a wide area in small units with limited equipment. On this point the report says that "the question of economy as determined by concentration of naval repair establishments must yield absolutely to the far more serious necessities of the fleet, as undue concentration of such naval repair establishments might very easily involve in time of war military disaster." In this connection the commission points out that in the event of a war the navy yards would be called upon to repair and keep in condition not only all the regular naval vessels but also a large number of merchant ships taken over as auxiliaries. These ships would be widely scattered over a great length of coast and should have access to repair facilities within a reasonable distance.

W. L. C.

Mineral Products of the United States

The statistics of the production of minerals in the United States in 1915 and preceding years have been issued by the United States Geological Survey. The total value of metallic minerals reached \$992,816,853 in 1915, as compared with \$886,179,981 in 1906 and \$187,880,880 in 1880. The total value of non-metallic minerals was \$1,393,565,098 in 1915, \$1,016,390,015 in 1906 and \$173,581,917 in 1880. In 1915 the total value of all minerals was \$2,393,831,951; in 1906 it was \$1,902,769,996 and in 1880 \$367,462,797. The quantity of iron ore produced in 1915 was 55,493,100 long tons, valued at \$101,288,984, and it is noteworthy that the 47,749,728 tons produced in 1906 was valued at \$100,597,106, or practically as much. Only 928 net tons of tungsten ore, valued at \$348,867, was produced in 1906; in 1915 the output reached 2332 net tons, valued at \$4,100,000. The crude magnesite output of 7805 net tons in 1906 was worth \$23,415; in 1915 30,499 net tons was valued at \$274,491. The production of fluor-spar rose from 40,796 net tons in 1906 to 136,941 tons in 1915, the value increasing from \$244,025 to \$764,475.

As a means of increasing employees' interest in the operations of the company, the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., will use each week several columns of the Montour Falls *Free Press* for company news. The first issue of the paper to carry this feature was that of January 17. Under the heading "Shepard News" is given a large amount of interesting matter on company athletics, recent orders, technical school developments, with personal notes, etc.

The Perfection Machine & Tool Works, 314 Fourteenth Street, Buffalo, N. Y., composed of B. J. Phillips and J. E. Harris, has been dissolved by mutual agreement. The business, property and all assets have been transferred to the recently formed Perfection Machine Works, Inc., which will continue the manufacture of new parts for machines, the building of special machinery and the execution of die, tool, model and experimental work.

The annual convention of the sales and factory organizations of the Chicago Pneumatic Tool Company was held at the Great Northern Hotel, Chicago, Jan. 11, 12 and 13. The program included a trip to the company's plant at Chicago Heights concluding with a banquet at the Great Northern on Saturday evening, Jan. 13. About 100 of the company's branch managers and representatives were in attendance.

The New Jersey Wire Cloth Company, Trenton, N. J., has removed its Philadelphia office and store to more commodious quarters at 223-227 Arch Street.

Bethlehem's Large Dividend

The directors of the Bethlehem Steel Corporation, at its regular meeting, Jan. 23, by unanimous vote, declared a 200 per cent stock dividend, offered the shareholders the right to subscribe to \$15,000,000 more of new common stock at par and increased the annual dividend rate. The distribution was made from earnings exceeding the predictions of the company's officers. Taken together, the stock dividend, the right to subscribe to the new stock and the increased dividend rate amount to approximately a disbursement of \$72.50 in cash; it brings the capital stock outstanding to about \$60,000,000, compared with \$15,000,000 heretofore, and places the company's capital stock within the reach of the general public. The new stock was quoted on the New York curb at \$131 on Tuesday afternoon.

The increase of the capital stock through the 200 per cent dividend and the sale of \$15,000,000 additional stock has not yet been approved by the stockholders, but a special meeting has been called for Feb. 14, at which their approval of the new financing plan will be asked. For the present the company declares a \$10 quarterly dividend on the old common stock, which is an increase of \$2.50 over the rate paid last year, and places the old stock for a short period on a \$40 annual basis. After the new increase in capital has been approved a rate of \$10 a year will be fixed by the directors on the total stock, which is equivalent to 40 per cent annually to present stockholders.

The announcement of net earnings is \$43,593,968 in 1916, which compares with \$24,831,408 in the year ended Dec. 31, 1915. These earnings are equivalent to approximately 280 per cent on the present common stock outstanding, and compare with about 112 per cent in the corresponding period in 1915.

Regarding rumors that the company was about to create a new first and refunding mortgage of about \$100,000,000, Chairman Charles M. Schwab said such action might be asked of the stockholders at the annual meeting in April, but that nothing definite had been decided. Such a mortgage, it is said, would be used largely for refunding purposes, although it is possible that a small margin of the proceeds of the issue would be used for new construction. It is for that purpose and to provide additional working capital that the new \$15,000,000 of common stock is being offered to stockholders. He further said:

"As appears from the comptroller's report of earnings the earnings of the corporation for the last calendar year are \$61,717,329. After deducting the interest charges of \$3,772,575, and charging off \$14,350,785 to depreciation and depletion, the aggregate net addition to the surplus is \$43,593,968, making the total surplus as of Dec. 31, 1916, \$69,370,198. The orders on hand at the beginning of the present year aggregate approximately \$193,500,000, exceeding those of a year ago by about \$18,000,000."

Preliminary work for laying the first keel at the new plant of the Sun Shipbuilding Company, Chester, Pa., is expected to get under way this week. A large number of workmen are finishing the five ways and the cranes are being completed. The machinery has been installed in the fabricating plant. The building for the administration department is now being erected and the steel columns for the boiler shop are being put in place. This latter building will be 120 x 400 ft.

The American Shipbuilding Company has taken a contract from the Standard Oil Company for an oil boat for the Great Lakes for delivery in 1918. It is stated this will be the largest oil carrier on the Lakes. It will be 434 ft. in length overall, 420 ft. keel, 55 ft. beam, 28 ft. depth, and will have a capacity of 8000 tons, or about 2,700,000 gal. of oil.

Arrangements are being made for the formation of a local council of the National Safety Council in Cleveland. C. W. Price, field secretary of the National Safety Council, will visit Cleveland within the next few weeks to start the organization.

Pittsburgh and Nearby Districts

At the annual meeting of the Engineers' Society of Western Pennsylvania, held in its rooms in the Oliver Building, Pittsburgh, last week, Alexander L. Hoerr, chief engineer National Tube Company, was elected president; George H. Neilson, general manager Braeburn Steel Company, vice-president, and George H. Barbour and E. W. Pittman, directors. An address on "Our Society" was delivered by Samuel E. Duff, the retiring president.

The Pittsburgh Steel Company, Frick Building, Pittsburgh, reports that its sales for the six months ended Dec. 31, 1916, were \$14,371,295.61, against \$9,660,259.48 in the same period in 1915, an increase of \$4,711,036.13. Net profits were \$5,037,111.25, against \$1,695,108.60, an increase of \$3,332,002.65.

The Superior Steel Company, Carnegie, Pa., recently purchased by Philadelphia and New York bankers, has elected the following officers: James H. Hammond, president; Edwin W. Harrison, vice-president; Joseph F. Hedges, secretary and treasurer; Howard H. Henry, assistant secretary and assistant treasurer. Mr. Henry is to be located in Philadelphia to take care of stock transfers and other financial matters. The directors comprise the above named and R. K. Cassatt, E. C. Lynch, H. B. Clark and F. Wilson Pritchett, these four representing the Eastern banking interests on the board.

It is reported that the Monongahela Railroad Company has completed preliminary plans for the construction at Brownsville, Pa., of a machine and erecting shop, 166 x 200 ft., one story, estimated to cost \$150,000.

The American Enameling & Mfg. Company, Kensington, Westmoreland County, Pa., has been incorporated with a capital stock of \$100,000 to manufacture iron and steel articles, cooking utensils, etc. Among the incorporators are O. W. Buening, East End Avenue, Wilkinsburg; Charles A. Rowan, Coal and Rebecca avenues, Wilkinsburg, and P. W. Morgan, 312 Marguerite Avenue, Wilmerding, Pa.

The William Tod Company, Youngstown, Ohio, has on its floor some heavy machinery for shipment to Japan and is also turning out some large engines for the Bethlehem Steel Company, South Bethlehem, Pa. None of this equipment will be ready for shipment for several months.

The Warwood Tool Company, Wheeling, W. Va., is making some additions to its plant, but states it has bought all the material and machinery it will need.

Stockholders of the Standard Underground Cable Company, Pittsburgh, on Tuesday authorized an increase in the capital stock from \$3,500,000 to \$10,000,000. The directors also declared a stock dividend of 50 per cent, equal to \$1,750,000 par value. However, as this stock has a market price of \$400 a share, the actual value of the stock dividend is nearly \$4,500,000. This is the largest stock dividend ever declared by the company and is double the last previous stock dividend declared in March, 1916. All former directors were re-elected.

The Jones & Laughlin Steel Company is building four new 50-ton open-hearth furnaces at its Soho works, Pittsburgh. The additional output of steel is needed to take care of the new 128-in. plate mill now being set up, and which will be making plates this summer. The company has had four 30-ton open-hearth furnaces at the Soho works.

The annual meeting of stockholders of the Phillips Sheet & Tin Plate Company, operating tin-plate mills at Weirton and Clarksburg, W. Va., and Steubenville, Ohio, was held in its branch offices in the Frick Building, Pittsburgh, Jan. 23. All directors and officers were re-elected. E. T. Weir is president, D. M. Weir vice-president and secretary, and F. S. Loeb treasurer.

On Tuesday of this week the Carnegie Steel Company had 10 blast furnaces idle and 5 banked for want of coke. A few other stacks that had been closed

down for 24 to 48 hr., due to high water, are again in blast.

At the annual meeting of the James Lappan Mfg. Company, Pittsburgh, John W. Exler was elected president and general manager, he having formerly been president and treasurer. Frank J. Lanahan was elected vice-president, John E. Laughlin treasurer, and George W. Exler secretary.

The Trussed Concrete Steel Company, Youngstown, Ohio, is making plans to offer employees the opportunity of acquiring common stock in the company. At the annual meeting, to be held in Detroit, Feb. 13, stockholders will be asked to approve a resolution providing for the setting aside of 2000 shares of common stock, now in the treasury, for sale or gift to employees, as the directors may determine.

The Niles Car & Mfg. Company, Niles, Ohio, which has been manufacturing cars for electric railroads since 1901, will discontinue that line this year and devote its entire attention to building Niles motor trucks.

The Carnegie Steel Company has awarded the Rust Engineering Company, Farmers Bank Building, Pittsburgh, a contract for constructing ten 200 x 9.5-ft. tapered, reinforced-concrete chimneys for new coke ovens now being built by the H. Koppers Company.

Reports that the American Sheet & Tin Plate Company, which is adding 10 hot tin mills at its Shenango works at New Castle, Pa., making it a 40-mill plant, would also add 5 more hot mills are incorrect.

At the annual meeting of the Falcon Bronze Company, Youngstown, Ohio, last week, G. A. Doeright was re-elected president, John Noll vice-president, H. Z. Kelly secretary, and E. E. Miller treasurer. The company manufactures brass and bronze castings for rolling mills and steel plants, as well as other brass products.

The annual conference of the branch managers of the Trussed Concrete Steel Company opened at the Youngstown, Ohio, plant of the company on Jan. 23, to continue until Friday evening. Some 125 are participating, including Julius Kahn, president of the company; Gustave Kahn, sales manager, and S. M. Fecheimer, publicity director.

The Electrochemical Society's Spring Meeting

The annual spring meeting of the American Electrochemical Society is to be held at Detroit, Mich., May 2 to 5, 1917. A general outline of the program includes visits to automobile plants on May 2, with a road-house dinner that evening; sessions on electric steel, ferroalloys and general papers on May 3, with a smoker in the evening; a session on non-ferrous metals and low temperature electric processes on May 4, followed by visits to electric steel plants and power houses in the afternoon, and addresses by President Fitzgerald and Alexander Dow in the evening. May 5 is to be devoted to electro-deposition of metals, the theory and prevention of the rusting of iron, and other papers.

Orders for Locomotives

Locomotive orders in the past week have called for a total of 87. Of these the American Locomotive Company will furnish the Buffalo, Rochester & Pittsburgh with 30 Mallets, Pacifics and switching locomotives and the Chemin de Fer du Midi with 40 consolidated locomotives each weighing 161,000 lb. The Baldwin Locomotive Works will build nine 6-wheel switching locomotives for the Southern Pacific. Prominent inquiries include 30 from the Seaboard Air Line and a large number, yet to be made public, from the Lehigh Valley. Orders in January up to the 20th are estimated at 370, of which 128 were for export.

The Eugene W. Pargny, a 600-ft. freight boat that is being built for the Pittsburgh Steamship Company and named after the president of the American Sheet & Tin Plate Company, was launched at the Lorain, Ohio, yards of the American Shipbuilding Company Jan. 20.

Machinery Markets and News of the Works

FREIGHT EMBARGOES FELT

Shortage of Materials in Many Plants

Exports Are Hampered—Automobile Makers Expected to Become Active Buyers in the Near Future

The trade appears to be more active in the Central West than in the East. On the seaboard, inquiries are being received from many foreign countries, and more business could be done were it possible to secure immediate deliveries. The West, however, has some good export inquiries also, as illustrated by an inquiry in Cincinnati for 300 lathes for shipment to Russia. The manufacturers of tools in the West are much hampered by the difficulty in making shipments to the seaboard, as well as by delays in deliveries of raw materials needed by them, all due to embargoes, congestion and car shortages.

In Chicago there is a heavy demand for the larger sizes of standard tools.

Detroit is looking for active buying by the automobile makers early in February, when the shows are out of the way.

The Kent-Owens Machine Company, Toledo, Ohio, has placed orders for about \$65,000 worth of tools, mostly with Cleveland dealers. In the latter city much is expected also from the automobile builders at an early day.

Considerable new construction work is being held up because of the high cost of materials in and near Cleveland.

In the Milwaukee market, and in that from the Pacific coast, mention is made of railroad troubles, the shipyards in the Northwest having to curtail operations because of a shortage of materials. Similar complaint comes from the Central South and Milwaukee.

Salesmen in New York are putting forth more effort to sell their lines than has been necessary for some months, one reason for which is that some of their competitors can make better deliveries than were possible a few weeks ago.

New York

NEW YORK, Jan. 24, 1917.

Domestic business continues to show a quiet trend, but with the passing of the inventory period the trade is confident that activity will resume the good pace which was set in the last few months of 1916. Meanwhile the export demand continues good, and a vast amount of additional business could be done were it possible to secure immediate delivery of standard tools. Salesmen have lately been obliged to put forth more of the old-time effort which kept them busy prior to the war, and they make no secret of being pleased with the opportunity of giving their salesmanship greater sway. At the same time, they sometimes find it galling to lose a sale, after a hard fight has been made for a delayed delivery, because two or three competitors can make immediate shipments.

The export inquiry is well distributed, a good deal of it coming from buyers who are here from Russia, Italy, France,

Spain and Switzerland. One export inquiry calls for 40 large turret lathes, further details of which cannot be given.

The Pennsylvania Railroad is inquiring for a few tools, action on which has been pending for some time, but otherwise the railroads are showing but little interest. The majority of domestic inquiries specify single tools.

The Goldschmidt Thermit Company, 120 Broadway, New York, has purchased 16 lots in Jersey City, on Johnson Avenue and Bishop Street, to provide additional space for the future expansion of its works.

The National Wire Wheel Works, Inc., Geneva, N. Y., recently incorporated with a capital stock of \$350,000, has purchased the machinery, stock and equipment of the Zarth Wire Wheel Works, Aurora, Ill., and has removed it to Geneva, N. Y., where it has secured and remodeled the plant long known as the Geneva Steam Bending & Spoke Works, recently used by the Indian Splint Mfg. Company. Sufficient additional labor-saving machinery is being installed to produce 100 wheels per day, and the plant will be completed by Feb. 1. It is expected to reach the contemplated output within three months from that time. The manufacturing facilities will probably be extended within the next six months, and if that is done quite a lot of additional machinery will be required. Wallace W. Page, secretary of Geneva Cutlery Company, is president; William O'Hanlon, cashier Geneva National Bank, and Edward H. Baker, president of the Cole Motors Company, Buffalo, are vice-presidents. Horace L. Henry, treasurer of Geneva Cutlery Company, is treasurer. Henry B. Graves, for 20 years general manager of the Standard Optical Company at Geneva, is secretary and general manager. The officers, with David H. Henry, president, and Walter Althoff, vice-president and general superintendent of the Geneva Cutlery Company; Howard B. Smith, Buffalo, and Walter F. Hofheins, attorney, Buffalo, are directors of the company. The company will manufacture a patented quick-change wire automobile wheel.

The Lapp Insulator Company, recently incorporated with a capital stock of \$150,000, is erecting a plant at Le Roy, N. Y., for the manufacture of high-voltage insulators and electric transmission line equipment. It will be one story, 125 x 340 ft. The company is in the market for machine tools and mill supplies. J. S. Lapp, general manager, was for 11 years manager of the Locke Insulator Mfg. Company, Victor, N. Y.

The Leslie & Elliott Company, operating a boiler works at East Railway and Iowa avenues, Paterson, N. J., which it acquired a few months ago from the partnership of Leslie, Elliott & Co., has elected the following officers: David Leslie, president; William Elliott, Jr., secretary and treasurer, and Henry Smith, director. The company, which is capitalized at \$125,000, is continuing the business without change.

The Empire Foundry Company, Port Chester, N. Y., incorporated last July with a capital stock of \$5,000 by A. W. Braun, J. Fuch and Benjamin Mills, has changed hands. On Dec. 1 the interests of Messrs. Fuch and Braun were purchased and they have severed their connections with the company. The plant, which the company took over following its formation, was previously operated by J. A. Taylor. The company has made extensive improvements in the plant and is now installing a number of machines. It is figuring on enlarging its molding shop and increasing its capacity to at least three times the present output. Benjamin Mills is president; Charles W. Stevens, vice-president and treasurer, and M. A. Mills, secretary. The company manufactures soil pipe and fittings and gray-iron castings.

The Rynehart Rim Tool Company, 19 Fulton Street, Brooklyn, N. Y., recently incorporated with a capital stock of \$5,000, has increased its capital stock to \$50,000 in order to properly develop its business. The company manufactures a tool for expanding both crooked and bent automobile wheel rims.

The six-story factory of the Manhattan Brass Company at 332 East Twenty-eighth Street, New York, was destroyed by explosion and fire recently. The loss has been estimated at around \$100,000.

The Hagerstrom & Chapman Company, 85 Columbia Street, Newark, N. J., jewelry manufacturer, has filed plans for a new two-story plant at 9 Orchard Street, to cost about \$10,000.

The Duratex Company, 768 Prellinghuysen Avenue, New-

ark, N. J., manufacturer of leather, has increased its capital stock from \$500,000 to \$1,500,000, to provide for business extensions.

The Austin Specialty Company, Newark, N. J., has been incorporated with a capital stock of \$125,000 to manufacture aluminum products. Harold A. Dodge, Walter J. Leutherow and John B. Then, 171 Clinton Place, Newark, are the incorporators.

Aurello Polla, Newark, N. J., has purchased a three-story factory at 125 Bank Street and will establish a plant for the manufacture of scissors, knives, etc.

The Insel Company, Newark, N. J., manufacturer of celluloid specialties, has filed articles of incorporation with a capital of \$50,000. The company has acquired property at 250 South Street to be used for a new manufacturing plant. The present factory of the company on Frelinghuysen Avenue will be moved to the new site and capacity increased. Max Insel and Evarts G. Loomis are proprietors of the company.

The L. & L. Mfg. Company, Newark, N. J., has been incorporated with a capital stock of \$125,000 to manufacture metal goods and hardware. John T. Litoney, H. E. Wolf and Henry W. D. Loeffler, 291 Washington Street, Newark, are the incorporators.

The Irvington Tool & Die Works, Irvington, N. J., has been incorporated with a capital stock of \$25,000 to manufacture tools and dies. Albert Sarossy, Stephen Schaffen and J. G. Hilton are the incorporators. Registered office, 18 Washington Place, Irvington.

The Joseph Dixon Crucible Company, Monmouth Street, Jersey City, N. J., manufacturer of graphite products, will build an addition to its plant on Wayne Street to cost about \$20,000.

The Frederick D. Shaper Elevator Company, 239 Washington Street, Jersey City, N. J., has been incorporated with a capital of \$75,000 to manufacture elevators. Frederick D. Shaper, 29 Pennington Street, Newark; Philip Halpin, 107 Kearny Avenue, Kearny, and Adam Steer, 467 West 166th Street, New York, are the incorporators.

The Erie Railroad, Jersey City, N. J., is building an addition to its plant on the Kearny meadows to be used as repair shops.

The Kent Motors Corporation, New York, is making rapid progress in the construction of its automobile manufacturing plant, Hillside Park section, Belleville, N. J. The machine shop, assembling plant and body-building department are now being completed; a metal-working shop is being erected. Contracts have been awarded for the construction of foundry, enameling ovens and executive offices. The plant will have a capacity of about 15,000 cars per year, and is estimated to cost \$300,000.

The Herzog Lamp Company, Union Hill, N. J., has been incorporated with a capital of \$25,000 to manufacture incandescent lamps. Edward J. Simon, 149 Palisade Avenue, Union Hill, John T. Simon and William F. Herzog are the incorporators.

Fire Jan 17 destroyed part of the plant of the Union Powder Corporation, Parlin, near Perth Amboy, N. J., with loss reported at \$50,000.

The Paterson Parchment Paper Company, 35 Eighth Street, Passaic, N. J., has increased its capital from \$1,000,000 to \$3,000,000, to provide for proposed extensions.

The Standard Shipbuilding Corporation, 44 Whitehall Street, New York, operating a plant at Shooters Island, Staten Island, has made application to the New York Harbor Line Board for permission to add a tract of 35 acres to Shooters Island, to be used for proposed extensions. Hearings on the application are now being held.

The Mulliner-Enlund Company and the Mulliner Machine Tool Company at Syracuse, N. Y., have been consolidated and have incorporated under the name of the Mulliner-Enlund Tool Company, with a capital stock of \$100,000. The new company will continue the manufacture of tools, hardware, etc. R. H. Mulliner, G. N. Enlund and W. A. Ridings, Syracuse, are the incorporators.

Plans are being prepared for a factory building, 50 x 100 ft., three stories, and a heating plant, to be erected by the Kellogg Mfg. Company, 3 The Circle, Rochester, N. Y., manufacturer of automobile accessories.

The Emerson Motor Company, Kingston, N. Y., T. J. Campbell, president, has plans in progress for a molding room, 60 x 120 ft., one story.

M. L. Oberdorfer, 804 East Water Street, Syracuse, will erect a core building, 50 x 101 ft., 1½ stories, from revised plans just completed.

The Erie Forge Company, Erie, Pa., is rebuilding its hammer shop damaged by fire Dec. 25, at an estimated cost of \$150,000.

The Buffalo Bridge & Machinery Corporation, Buffalo, has

recently been incorporated with a capital stock of \$50,000 to manufacture bridge material, construct highway bridges and repair road-building machinery. W. S. Meserve, 516 Ellicott Square Building, is president.

The Dold Packing Company, William Street and Fillmore Avenue, Buffalo, has let contract for a three-story concrete engine room to cost \$15,000.

The Thompson Heater Corporation, Buffalo, has been incorporated with a capital stock of \$150,000 by Frank A. Abbott, Morgan Building, H. M. Jack, and others to manufacture boilers and radiators. A manufacturing plant is being arranged for.

Plans have been filed by the Houk Mfg. Company, Elmwood Avenue and the New York Central Railroad, Buffalo, manufacturer of wire wheels for automobiles, for a two-story addition of brick and steel.

The Buffalo Sled Company, North Tonawanda, N. Y., has completed plans for a factory and warehouse to cost \$150,000. J. J. Snyder is president.

The Ford Brothers Mfg. Company, Rochester, has plans completed for a wood-working shop, 60 x 90 ft., to be erected on Gunnison Street.

Reuther Brothers, Paterson, N. J., plan the erection of a gray-iron foundry, 70 x 200 ft., one story, and 25 x 175 ft., two stories, with auxiliary structures. Contracts will be awarded shortly. The equipment for this increased capacity has been purchased.

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., wants one or two second-hand 16 x 42 in. universal grinding machines in good condition.

The Smith & Caffrey Company, Syracuse, N. Y., is in the market for a structural punch for Bethlehem sections.

Walsh's Sons & Co., 295 Passaic Street, Newark, N. J., will purchase rolling-mill machinery.

R. L. Lake, 1966 Valentine Avenue, New York, is in the market for a horizontal boring, drilling and milling machine in good condition and for a constant-speed direct-current motor, with 4½-in. diameter boring bar.

New England

BOSTON, MASS., Jan. 22, 1917.

The New England Machinery Company, New Haven, Conn., has filed a certificate of increase of capital stock from \$100,000 to \$200,000. The company has begun work upon an addition to its machine shop, 90 x 200 ft., one story.

The Hyde Windlass Company, Bath, Me., has awarded a contract for an addition to be used as a machine shop and office building.

The MacLeod Mfg. Company, Boston, Mass., has been incorporated with a capital stock of \$50,000 to manufacture iron, steel and other metal products. The directors are Alex MacLeod, Waverly, treasurer; George F. James and J. H. Hundly.

The Napier Saw Works, Springfield, Mass., have been incorporated with a capital stock of \$1,000,000. The directors are Charles Napier, president; Charles H. Parsons, Springfield, treasurer; and Fred T. Ley.

The Colt's Patent Fire Arms Mfg. Company, Hartford, Conn., has had a bill introduced in the State Senate authorizing the company to increase its capital stock from \$2,500,000 to \$10,000,000.

The Challenge Tractor Company, Portland, Me., has been incorporated with a capital stock of \$200,000. Eben Winthrop Freeman, Portland, is president and treasurer.

The New Britain Machine Company, New Britain, Conn., has voted to increase its capital stock from \$800,000 to \$1,000,000.

The Whittemore Hamm Company, Boston, Mass., has been incorporated with a capital stock of \$100,000 to manufacture machines, ships, motors, etc. The directors are Robert Cushman, president; Winthrop C. Whittemore, 95 Milk Street, Boston, treasurer; and W. E. Hamm.

The Draper Company, Hopedale, Mass., is to build an addition, 79 x 109 ft., four stories.

The Gurney Heater Company, 188 Franklin Street, Boston, Mass., has begun the erection of an addition, 82 x 127 ft., one story, to its machine shop at its South Framingham, Mass., plant.

The Bryce Mfg. Company, Bristol, Conn., has been incorporated with a capital stock of \$50,000 to manufacture machinery. The incorporators are William Bryce, New Haven; John Bryce, David Bryce and George Bryce, all of Bristol.

The Geometric Tool Company, New Haven, Conn., has awarded a contract for a one-story addition to cost \$11,000.

The Fitzgerald Mfg. Company, Winsted, Conn., will erect an addition next spring to its plant on Meadow Street.

The plant of the F. L. Horton Mfg. Company, maker of electrical appliances, 36 Whittier Street, Boston, Mass., was destroyed by fire Jan. 18 with a loss of about \$15,000. The building of the Bay State Saw & Tool Mfg. Company was also slightly damaged.

The General Electric Company has announced that a considerable portion of its railway motor work will be removed from the Lynn, Mass., plant to its plant at Erie, Pa. It is expected that lighter work will take the place of the heavy work taken away and that there will be no diminution of the working force at Lynn.

The Chase Metal Works, Waterbury, Conn., has secured building permits for an addition, 40 x 200 ft., one story; an addition, 60 x 160 ft., one story; an addition, 60 x 100 ft., one story; and for foundations for a one-story building, 120 x 660 ft.

The Bantam Anti-Friction Company, Bantam, Conn., is considering the erection of a number of houses for its employees.

For the first time since the Spanish War a night shift has been established at the Government Arsenal, Springfield, Mass. The arsenal is busy with gun and pistol orders.

The Union Steel Casting Company, Gerard Street, Roxbury, Mass., wants two second-hand bottom-pour steel ladles of 10 to 15 ton capacity and one second-hand sand grinder with 7 to 10 ft. pan.

Hamilton & DeLoss, Inc., Bridgeport, Conn., recently incorporated to manufacture metal goods, is erecting its plant at that place. M. E. Cutler is supervising engineer.

Philadelphia

PHILADELPHIA, PA., Jan. 22, 1917.

The E. T. Fraim Lock Company, Lancaster, Pa., has purchased and will remove 14 brick houses adjoining its plant for the purpose of enlarging its manufacturing capacity. The new buildings will be four or five stories. The company, which at present manufactures 8,000,000 locks per year, plans to double its capacity and will add about 600 men to its working force. E. T. Fraim is president.

The Martin Carriage Works, York, Pa., will be taken over in about a month by the Martin Truck & Body Corporation, which has been organized with a capitalization of \$300,000 preferred and 30,000 shares of common stock. The present plant has a capacity of 20,000 vehicles per year.

The Braemer Air Conditioning Corporation, Lafayette Building, Philadelphia, recently incorporated, has acquired the business of Warren Webster & Co., Camden, N. J., manufacturers of air-conditioning and air-washing apparatus. William G. R. Braemer, president of the new company, is the inventor of the Webster devices, and was for many years chief heating and ventilating engineer for the Buffalo Forge Company. H. A. Terrell, for nine years with W. Webster & Co., is secretary, and Herbert Coward, for several years Philadelphia manager for the Buffalo Forge Company and later with the Carrier Engineering Corporation, is treasurer.

The Schwarz Wheel Company, Margaret Street, Philadelphia, manufacturer of automobile wheels, has awarded contract for a one-story brick addition to its plant. P. M. Sax is the contractor.

The Advance Machine Company, Philadelphia, operating machine repair shops, has awarded contract for an addition to its plant at Phillips and Dauphin streets to cost about \$3,500.

G. Wentworth Miller and William B. Henman, Philadelphia, have incorporated in Delaware the John Duff Mfg. Company, with a capital of \$25,000, to manufacture patented oil cans and retainers.

H. P. Eldman, Philadelphia, will build a one-story machine shop, 60 x 200 ft., at D Street and Erie Avenue, to cost \$20,000. The Pomeroy Construction Company has the contract.

The H. T. Paiste Company, 3201 Arch Street, Philadelphia, manufacturer of electrical supplies, will build a one-story addition, 32 x 96 ft., to its plant at Thirty-second and Cherry streets.

The Heilprim Mfg. Company, Philadelphia, manufacturer of toy rifles and kindred specialties, has removed its plant to Nineteenth and Westmoreland streets, to provide increased capacity. The Repro Arts Machinery Company, manufacturer of cameras for photo-engraving work, will occupy a part of the vacated premises of the Heilprim Company at 1425 North Twenty-first Street, as an addition.

The Empire Rubber & Tire Company, Clinton and Mulberry streets, Trenton, N. J., has been reorganized with a capital of \$4,500,000 to provide for increased operations in the manufacture of automobile tires and mechanical rubber goods. J. E. Baum, president of the Supplee-Biddle Hardware Company, Philadelphia, has been elected president of the company; E. B. McKay, formerly Chicago manager, has been elected vice-president in charge of plant operations. It is said that the present capacity of the plant will be doubled during the year.

The Monument Pottery Company, Trenton, N. J., manufacturer of sanitary earthenware, has been reorganized and is planning for improvements and extensions in its plant on Ingham Avenue. John F. Wolff, Chicago, formerly president of the L. Wolff Mfg. Company of that city, has been elected president; Harold W. Wolff has been elected vice-president, with offices at Trenton.

The Eastern Machinery & Equipment Company, 127 Euclid Avenue, Haddonfield, N. J., has been incorporated with a capital of \$10,000 to manufacture machinery. J. Huron Wood, Lura Wood and Porter M. Wilson are the incorporators.

The MacAndrews & Forbes Company, Third Street, Camden, N. J., manufacturer of prepared building board and similar specialties, will build a one-story brick addition to its plant, 90 x 100 ft., to cost about \$35,000.

The Board of Trustees, Pennsylvania State College, State College, Pa., has arranged a budget of \$1,742,000 for the erection of new buildings, including mechanical shops and laboratories.

The Pennsylvania Railroad is planning an expenditure of about \$200,000 for the construction of new freight yard, freight houses and handling and loading equipment at Steelton, Pa., to provide for shipments from the local plant of the Bethlehem Steel Company.

J. Victor Wambaugh, Glen Rock, Pa., and associates have incorporated in Delaware the Standard Oil Gas Burner Company, with a capital stock of \$30,000, to manufacture oil gas burners. Chauncey B. Yost and Frank Reist, York, Pa., are also incorporators.

Fire, Jan. 16, destroyed the machine repair shop, pattern shop and electrical department of the Sweet's Steel Company, Government Place, Williamsport, Pa., with loss estimated at \$25,000. The company specializes in iron and steel bars and forgings.

Final organization of the Bethlehem Motor Corporation, Allentown, Pa., has been perfected with the election of officials to operate the business. The initial plant will be 90 x 475 ft. and cost about \$33,000. A present structure on the property will be used as the body-building department. Two models of motor trucks will be manufactured of 2500 and 4500-lb. capacity, respectively. Arthur T. Murray is president; D. George Dery, Allentown, vice-president; and Martin E. Kern, treasurer.

The Lehigh Portland Cement Company, Allentown, Pa., has increased its capital from \$12,000,000 to \$18,000,000, to provide for business extensions. The company is now operating fifteen cement mills, having recently acquired the plant of the Iola Portland Cement Company, Iola, Pa. Colonel Harry C. Trexler is president.

The McCall-Mitchell Company, Dover, Del., has been incorporated with a capital stock of \$200,000 to manufacture machinery. Ferris Giles, E. Lynch and K. N. Dougherty, Wilmington, Del., are the incorporators.

The National Rubber Company, Pottstown, Pa., manufacturer of automobile tires, is building a five-story plant. J. G. Feist is president.

The General Chemical Company, 25 Broad Street, New York, operating a plant at Marcus Hook, Pa., has acquired a tract of 21 acres adjoining its plant, and is reported to be planning for the erection of a large addition.

The Dundore Mfg. Company, capitalized at \$75,000, will manufacture automobiles and automobile parts at Reading, Pa. Those interested are Charles S. Dundore, Edwin S. Smith, W. Stewart Wray and D. Elmer Worley.

Baltimore

BALTIMORE, MD., Jan. 22, 1917.

Talbott Denmead, 207 St. Paul Street, Baltimore, has purchased a 15-acre tract at Sparrows Point, Md., upon which it is said a New England company plans to erect a plant for the manufacture of machine and wood screws. The plant is to cost about \$200,000. Mr. Denmead will not announce the name of the company at this time.

The Electrolytic Zinc Company, Sixteenth Street and Second Avenue, Highlandtown, Md., is reported contemplating the construction of an additional plant to cost about \$75,000.

Efforts to locate a suitable site in or near Baltimore are being made by the American Refractories Company, Joliet, Ill.

A brick and steel assembling building and machine shop to cost about \$100,000 will be built for Pusey & Jones, Wilmington, Del. The building will be two stories and of concrete and steel construction. Application for the permit has been made. It will be 170 x 456 ft., one story.

Chicago

CHICAGO, ILL., Jan. 22, 1917.

For standard lines of machine tools, particularly the larger sizes, demand continues more than normally active. It is not so continuous as it was, but the needs of buyers are still very pressing. This shows itself in the endeavor to fill their requirements in the second-hand and remanufactured tool market before considering new machines, deliveries of which are still remote. Sales made at Chicago into distant territories more accessible to other markets are so frequent as to indicate a larger supply of the heavier machines here than elsewhere.

Several of the largest of the local industries have been buyers in the past week of machines in small lots, and the American Steel & Wire Company is in the market for about ten machines. Of the large railroad lists outstanding the only one thus far closed is that of Chicago, St. Paul, Minneapolis & Omaha Railway Company.

The market for special tools is now almost entirely neglected, and in the purchase of used machinery of standard manufacture in the smaller sizes dealers are declining to buy at higher prices than those of two and three years ago.

The Sefton Mfg. Corporation, 1437 West Thirty-fifth Street, Chicago, is erecting a one-story factory building, 25 x 145 ft., to cost \$13,000. The company manufactures folding paper boxes.

The Chicago Shipbuilding Company, 101st Street and the Calumet River, South Chicago, is building a two-story steel frame machine shop to cost \$12,000.

The Whiting Foundry & Equipment Company, Harvey, Ill., is preparing plans for an extension to be used as a steel foundry.

The Belleville Malleable Iron Company, 1506 Federal Reserve Bank Building, St. Louis, Mo., which recently purchased property at Belleville, Ill., has been organized with a capital of \$200,000 and expects to be in operation within 90 days. The company is in the market for malleable foundry equipment.

The Reder Foundry Company, 2125 Canalport Avenue, Chicago, has taken out a permit for the erection of its one-story foundry, 60 x 140 ft., of brick and steel, to cost \$12,000.

The United States Roller Screen & Ventilator Company, 8 South Dearborn Street, Chicago, will build a one-story factory, 47 x 100 ft. R. C. Clark is the architect, in care of the construction department, Armour & Co., Chicago.

James T. Downey, 509 North Union Avenue, Chicago, is adding to his factory an extension 120 x 150 ft., at a cost of \$40,000.

Guggenheim Brothers, packers, Chicago, have acquired a large site in the Union Stock Yards at a reported price of \$250,000, on which will be erected a packing plant and cold-storage warehouse.

Bell & Howell, 1801 Larchmont Avenue, Chicago, will build a one-story addition to their factory.

The Chicago & Northwestern Railroad is about to expend \$1,700,000 for the erection of new engine terminals and shops at Winona, Minn. A new erecting and machine shop, 125 x 354 ft., will be built and the present shop enlarged to accommodate the boiler, tank and flue departments. A new wheel shop will also be built.

The Lincoln Electric Works, 215 West Superior Street, Chicago, will open a plant at Bushnell, Ill., about Feb. 15. It will not open a plant Jan. 15 at Macomb, Ill., as has been stated elsewhere.

The Union Special Machine Company, 300 West Kenzie Street, Chicago, is in the market for a 10 x 24 in. Brown & Sharpe universal grinding machine, a No. 11 Brown & Sharpe plain grinding machine and a 3 x 18 in. Norton plain grinding machine, none over two years in use.

The La Plant Company, Marshalltown, Iowa, has started the construction of a two-story foundry addition, ell-shaped, 60 x 90 ft., to cost about \$6,000.

The Dodd Mfg. Company, 820 Mary Place, Minneapolis, Minn., has let contract to the Ganley Construction Company,

Plymouth Building, Minneapolis, for the erection of a two-story assembling plant, 60 x 130 ft., estimated to cost \$12,000. The company manufactures automobile dashes.

The plant to be built by the Sioux City Tire & Mfg. Company, Sioux City, Iowa, will be 80 x 130 ft., two stories, with boiler-room ell, 30 x 52 ft. Some of its material is already contracted for, but it will be in the market for a full line of manufacturing equipment for the making of automobile tires and tubes. Charles F. Sawyer is secretary.

The Rawleigh-Schryer Company, Freeport, Ill., suffered a loss estimated at \$190,000 as a result of fire which destroyed a large part of its plant. The company manufactures gasoline engines.

E. J. Miles & Co., Newton, Iowa, will build a one-story machine shop, 66 x 132 ft., at an estimated cost of \$10,000. Eckland, Fugard & Knapp, 111 West Monroe Street, Chicago, are the architects.

The Dewey Portland Cement Company, Kansas City, Mo., is contemplating the erection of a manufacturing plant on a site of 172 acres just purchased at Davenport, Iowa.

The Iowa Pure Iron Company, organized by J. L. Helsing and A. G. Helsing of Des Moines and Emil Bern of Wahoo, Neb., with a capital of \$100,000, will engage in metal manufacturing in a specialized line.

Stroud & Co., Omaha, Neb., manufacturers of farm implements and road-making machinery, have been incorporated with a capital of \$250,000.

The Huffschtmidt-Dugan Iron Works, Bend, Ore., is planning enlargements of its plant which will include a new machine shop and added equipment for its present works.

Milwaukee

MILWAUKEE, WIS., Jan. 22, 1917.

In spite of the serious handicap imposed upon machine-tool builders by the inability of railroads to handle shipments eastward, orders are received in large numbers and come from many sources. Export inquiry is again a feature, but the domestic demand is still so urgent that not much consideration can be given foreign buyers. Local shipments are the smallest in years, due to traffic congestion, and warehouses are filled to an even greater extent than in December, when it was thought the car shortage had reached its climax. Relief is afforded from time to time by the temporary cancellation of embargoes. Conditions are more favorable to production than for a long time past, due to an easier labor situation and the completion of plant extensions. It is no longer so difficult a matter to manufacture the tools as it is to get them into the hands of purchasers; still, all available capacity continues to be fully occupied. Increased activity is noted in the foundry trade and several small shops are being established throughout Wisconsin to handle a great mass of small custom business which the larger foundries cannot take, due to the pressure of large orders. Skilled foundry labor is still very scarce.

The Zietler & Lamson Motor Truck Company, Chicago, has decided to move its plant and headquarters to Wausau, Wis., where the Business Men's Association has agreed to furnish a 5-acre site and erect a factory and shop building, 194 x 300 ft., construction to begin about March 1. The company has increased its capital stock from \$100,000 to \$500,000. The present location at 4638-4646 West Madison Street, Chicago, will be occupied until the Wausau plant is ready. G. W. Lamson is president and J. M. Attley general manager.

The Northwestern Motor Company, Eau Claire, Wis., which specializes in gasoline-propelled railway section and inspection cars, has increased its capital stock from \$25,000 to \$50,000 because of the expansion of its business. Kim Rosholt is president and general manager.

W. A. Warren, Ashland, Wis., gasoline engine manufacturer, has practically closed negotiations with capitalists at Neenah-Menasha, Wis., for the establishment of a gas engine works in these twin cities. A corporation with an initial capital of \$10,000 will be organized at once.

The Elkhorn Factory Company, Elkhorn, Wis., has engaged James R. Law, architect, Madison, Wis., to prepare plans for a two-story brick and mill factory, 65 x 250 ft., to be occupied by the Frank H. Holton Company, Chicago, band and musical instruments, which will move from Chicago to Elkhorn upon its completion.

The Plqua Handle Company, Marquette, Mich., is preparing to erect a new wood-working factory, 66 x 320 ft., two stories and basement, with a separate power house, dry kilns, etc. Wernett, Bradfield & Mead, Grand Rapids, Mich., are the architects.

Stevens Point, Wis., is contemplating the erection of a new high school costing about \$100,000, to include a manual training department.

The Badger Brass Mfg. Company, Kenosha, Wis., has been purchased by the C. M. Hall Lamp Company, Detroit, Mich., at a price said to exceed \$400,000, and operations will be consolidated at once. Officials of the Badger Company, including George A. Yule, president; L. J. Kech, vice-president, and Richard H. Welles, treasurer and general manager, will retire. William F. Ankian, secretary and general manager of the Hall Company, formerly a Badger official, will take general charge of the business at Kenosha and will be assisted by George A. Maher, works manager. Administration will be conducted from the general offices in Detroit.

The J. L. Kunz Machinery Company, 2601 Vliet Street, Milwaukee, has been reorganized as the Kunz Wheel Company, with a capital stock of \$100,000, and will devote its entire attention to the production of resilient sheet steel wheels for motor trucks, etc. The present plant will continue to be used, with enlargement of the working force, and later extensions will be made as required.

The A. Z. Metal Works, Thiensville, Wis., which lost its plant by fire some time ago, has resumed operations in a new factory. It specializes in motor truck and tractor radiators and cooling systems. A. Zanzig is the principal owner.

The Hartford Iron Works, Hartford, Wis., has been organized by I. L. Bonniwell and Louis Rosche to establish a small custom foundry which will pay particular attention to agricultural implement and hardware castings. A furnace with cupola is being installed in the concrete block factory operated by Mr. Bonniwell and will be in charge of Mr. Rosche.

The Kempsmith Mfg. Company, West Allis, Milwaukee, manufacturer of milling machines, is taking bids through Vaughan & Meyer, consulting engineers, for a 200-kw. generator, engine and switchboard unit. Paul Thomas is general manager.

The Bucyrus Company, South Milwaukee, Wis., is making several small additions to its warehouse and shop facilities.

Owen P. Babbitt, Wausau, Wis., is engaging in the manufacture of special canning factory equipment on a small scale and may erect a plant in the spring.

The Waukesha board of public works, Waukesha, Wis., will call for bids soon on the installation of a complete septic tank system, with engine, pump, etc., at an estimated cost of \$10,000. E. R. Estberg is mayor.

The West Bend Aluminum Company, West Bend, Wis., manufacturer of kitchen and sanitary ware, is contemplating the erection of a two-story brick addition, 50 x 260 ft., to its plant.

The Valley Iron Works, Appleton, Wis., has increased its capital stock from \$60,000 to \$200,000. Important extensions to increase the facilities are said to be in contemplation. W. A. Fannon is president and W. H. Burns secretary.

Indianapolis

INDIANAPOLIS, IND., Jan. 22, 1917.

The Chamber of Commerce, Peru, Ind., has obtained the removal to that city from Chicago of the Smith-Huffman Metal Mfg. Company.

The Kerosene Carburetor Company, Frankfort, Ind., has received an order from the Ford Motor Company for 3000 carburetors. The Indiana Brass Company of Frankfort has been doing the machining and finishing of the carburetors, but its other business has grown so that the Kerosene Company contemplates building a factory where it can do this work in its own plant.

August Brentano, president, and Nestor Brentano, secretary, of the Southern Stove Works, Evansville, Ind., have sold their interests to their former business associate, Edward Kiechle.

Hobart, Ind., has been authorized to sell \$15,000 of bonds to raise funds with which to purchase a condensing steam turbine for its municipal electric plant.

The Mal-Gra Company, Cambridge City, Ind., manufacturer of castings, will enlarge its plant so as to employ an additional force of 100 men.

The Imperial Desk Company, Evansville, Ind., will build an addition to its factory to cost \$25,000.

The Indiana Brass Company, Frankfort, Ind., has been incorporated with \$10,000 capital stock to manufacture plumbing supplies. The directors are J. A. Johnson, C. E. Williams and T. M. Ryan.

The Franklin Mfg. Company, Franklin, Ind., has been incorporated with \$15,000 capital stock to manufacture furniture. The directors are Guy Fulton, Dudley A. Cox and J. W. Oliver.

The Van Arnham Mfg. Co., Fort Wayne, Ind., maker of

automobile castings, etc., has increased its capital stock by \$25,000.

The Clover Leaf Machine Company, manufacturer of concrete mixers, etc., South Bend, Ind., has filed articles of dissolution.

The Chamber of Commerce, Laporte, Ind., has closed negotiations for the organization of a \$2,500,000 corporation to manufacture automobile tires. The new company will occupy the buildings formerly used by the H. B. Clover Company. Chicago capitalists are back of the corporation.

Cleveland

CLEVELAND, OHIO, Jan. 22, 1917.

The Kent-Owens Machine Company, Toledo, Ohio, has placed orders for about \$65,000 worth of machine tools, most of this business going to a Cleveland machinery house. The market here is not active, few sales being reported outside of single tools. The demand from the automobile field in the Central West is quiet, but considerable business is in prospect from companies that are planning changes in their plants and in their models. The effect of the high cost of building appears more noticeable now than previously. Engineers report that considerable work is being held up until prices are lower, and some companies planning extensions are proceeding cautiously, going ahead only with buildings that they must have. Deliveries on lathes, milling machines and drill presses have eased up somewhat, although some builders are as far behind on shipments as ever. Deliveries on vertical boring mills appear worse than on other machine tools, makers being from six to fifteen months behind on shipments. The demand for steel-plant and coke-oven equipment continues very active. Cranes are also in good demand. There is considerable call for second-hand machinery.

A line of mill cutters and probably other tools will be manufactured by the Cleveland General Milling Tool Company, Cleveland, Ohio, which has been incorporated with a capital stock of \$50,000. The company has commenced operations, but has not yet secured a permanent plant. H. D. Jones, auditor of the Cleveland Hardware Company, and others are interested.

Plans for a plant to be built in Cleveland by the Coburn Machine Company, Franklin, Pa., are being prepared by George S. Rider & Co., engineers, Cleveland.

The Cleveland Motor Plow Company, Cleveland, Ohio, which recently erected a plant for the manufacture of motor plows, has placed contracts for an additional building, 60 x 300 ft. Considerable new machinery is being purchased.

The Wonder Heater Mfg. Company, Cleveland, has been incorporated with a capital stock of \$25,000 by F. A. Cottier, Jr., Louis Barnmeier, and others.

The Falls Clutch Company, Cuyahoga Falls, Ohio, is in the market for a 15-ton crane with 30-ft. span. There is also an inquiry out from the Ohio Forge Company, Cleveland, Ohio, for a traveling crane.

The Zehner Metal Sash & Door Company, Canton, has increased its capital stock from \$600,000 to \$2,000,000. The increase has been made because of the erection of a larger plant now under construction on a site where the original plant was destroyed by fire several weeks ago. It is expected that operations will begin in about 30 days.

Extensions to the plant of the Canton Steel Foundry Company, Canton, Ohio, including a third open-hearth furnace of 35 tons capacity, are nearing completion, and it is announced that the company plans further additions the present year. These will include a storehouse, 60 x 120 ft., and a brick pattern storage building.

The Hydro Motor Car Company, Canton, Ohio, has been incorporated with a capital stock of \$100,000 to build for government use motor cars that can be operated both on land and water. It is stated that if tests that are to be made shortly prove to be successful, a plant will be erected. Oliver Light, James P. Snyder and Harvey N. Pattison, of the Hercules Motor Company, Canton, are interested.

The Portage Iron & Wire Company, Akron, recently incorporated with a capital stock of \$50,000, has acquired a site on which it has started the erection of a plant. J. H. Batchman is president.

The Ryder Brass Foundry Company, Bucyrus, Ohio, will erect a temporary addition, 30 x 60 ft., to house its melting room, and plans in the near future to make permanent plant extensions.

The American Malleable Castings Company, Marion, Ohio, has commenced the erection of three additions to its plant that were recently noted. These will include two

foundry buildings, one 63 x 185 ft. and an extension to the annealing department, 62 x 63 ft.

The National Drawn Steel Company, East Liverpool, Ohio, is planning the erection of an extension to its plant, 100 x 200 ft.

It is announced that the Standard Steel Tube Company, Toledo, which recently increased its capital stock from \$150,000 to \$600,000, is not contemplating any immediate plant extensions, the increase being to furnish the company with more working capital. George R. Storer was re-elected president, P. B. Chase, vice-president, and H. H. Chase, secretary and treasurer.

The Duplex Hanger Company, Cleveland, is in the market for a No. 4 or 5 bulldozer and a Williams White multiple punch, about a 6-ft. model.

The Paramount Motor Company, Columbus, Ohio, will purchase a 1-in. four spindle National Acme or Gridley automatic screw machine in first-class condition.

The Bunting Brass & Bronze Company, Toledo, Ohio, is in the market for one 10 x 36 in. plain grinding machine, Norton preferred, with 20 in. wheels and standard equipment.

The Central Machine & Tool Company, Door Street and the Michigan Central Railroad, Toledo, Ohio, is erecting an addition containing 12,000 sq. ft. of floor space, increasing its present capacity three times. It will equip the extension with the latest machinery for the manufacture of tools, dies and special machinery.

Plans for the first unit of the new plant to be built by the East Palestine Rubber Company, East Palestine, Ohio, have been prepared and contracts for the buildings have been placed. These will include a factory building, 200 x 406 ft., and a power plant, 90 x 100 ft.

The Bellefontaine Automobile Company, Bellefontaine, Ohio, and the Economy Motor Car Company, Tiffin, Ohio, have been merged, and the Tiffin plant will be moved to Bellefontaine, where a new plant will be erected. Plans are being prepared for a two-story building, 80 x 200 ft. A. J. Miller is president of the new company and Johnson West is secretary.

The Sandusky Forge Company, Sandusky, Ohio, has placed orders for a 5000-lb. and a 6000-lb. steam drop hammer with the Erie Foundry Company, Erie, Pa.

It is announced that the Semi-Steel Foundry Company, Barberton, Ohio, will build a new foundry, plans for which have been completed.

It is reported from Niles, Ohio, that the Niles Car & Mfg. Company, which has been engaged in building street cars since 1901, will discontinue the car business and devote all its attention to the manufacture of motor trucks, in which it has been engaged for the past year.

Detroit

DETROIT, MICH., Jan. 22, 1917.

With a gain of 113 per cent in the number of automobiles manufactured in Detroit last year, an even greater gain is looked for in 1917. As a result, machine-tool companies are looking to automobile manufacturers for large orders to be placed after the closing of the Detroit Automobile Show on Jan. 27. The construction of the Ford Motor Company's blast-furnace plant will involve the expenditure of several million dollars this year and probably as much next year. Detroit, which has jumped from twelfth place to nearly third in ten years in the value of its manufactured products, is expecting as great an increase the coming year.

The Hackett Motorcar Company, Jackson, Mich., will be moved to Grand Rapids in the spring and will construct a brick and concrete factory at a cost of \$50,000. It is capitalized at \$1,000,000, and expects to manufacture 30,000 cars a year.

Grand Rapids has acquired a new industry which is at present manufacturing knock-down buildings. The company is capitalized at \$50,000, and H. F. Stiles is vice-president and general manager.

The Original Cabinet Company, manufacturer of interior woodwork, will move from Evanston, Ill., to its new factory buildings in Niles, Mich., this month.

The Clipper Belt Lacer Company, Grand Rapids, Mich., has increased its capital stock from \$200,000 to \$500,000.

The Bates & Edmonds Motor Company, Lansing, Mich., manufacturer of a special oil-burning engine and standard gas motor, is completing an addition which will double the capacity of its plant. James T. Edmonds is president and general manager.

The Hugh Lyons Company, Lansing, Mich., manufacturer of fixtures, is planning to double its output next year and is enlarging its plant.

The Brunswick-Balke-Collender Company is planning to centralize its factories in Muskegon, Mich., and is completing the erection of an automobile tire manufacturing plant which will turn out 1000 tires a day.

The Detroit Automobile Clamp Company, Detroit, has been incorporated by John M. Bryson, George W. Whipple and G. G. Collins, with \$40,000, to manufacture clamps, automobile and steel specialties.

The Gier Pressed Steel Company, Lansing, Mich., has increased its capital stock from \$500,000 to \$1,000,000.

The Field-Brundage Engine Works, Jackson, Mich., recently taken over by Montgomery Ward & Co., Chicago, has been incorporated with \$10,000 to manufacture machinery. The stockholders are G. R. Durgan and Z. I. Zook, Chicago, and J. R. Whiting, Jackson.

The Chalmers Motor Company, Detroit, has acquired 13 acres of land for the erection of an addition to its plant.

The Spranger Rim & Wheel Company, 163 Beaubien Street, Detroit, has changed its name to the Spranger Wire Wheel Company, and increased its capital stock from \$100,000 to \$300,000. It is constructing a new factory where all manufacturing will be done in the future. The directors are J. A. Lancaster, H. E. Adams and J. Robert Wilkin.

The St. Joseph Iron Works, St. Joseph, Mich., is having plans prepared for a one-story addition to its plant, 50 x 100 ft. A part of this will provide additional shop capacity.

Cincinnati

CINCINNATI, OHIO, Jan. 22, 1917.

An inquiry has appeared for 300 lathes to be shipped to Russia. Domestic business continues improving, and there is considerable railroad business that will come to light shortly, in addition to lists already issued. Nearly all yearly statements and inventories have now been completed and the general average will show that 1916 was one of the best in the history of the machine-tool business. Advanced manufacturing costs, however, curtailed net profits to a considerable extent. Makers of sugar machinery, stone crushers, farm tractors and other special lines did a record-breaking business last year, and the outlook is now very promising for 1917.

The Cincinnati-Bickford Tool Company, A. H. Tuechtee, president, Oakley-Cincinnati, is having plans prepared for an extensive addition to its plant that will be used as an erecting shop. Building details are not yet available.

The Peters Cartridge Company, First National Bank Building, Cincinnati, has plans under way for several large additions to its powder plant at King's Mills, Ohio.

The Edna Brass Works Company, Cincinnati, will soon make an addition to its plant on Reading Road that will be 90 x 130 ft., one story, of mill construction. The new building will house a machine shop and will also be used for storage.

The Newman Mfg. Company, Cincinnati, is contemplating erecting a factory in the Evanston district. The company manufactures machine tools and other specialties.

On Jan. 15 fire destroyed the flour mill of Nordmeyer & Berning, in Covington Ky., entailing a loss of about \$40,000. Rebuilding plans have not yet been given out.

The Vail-Rentchler Tractor Company, Hamilton, Ohio, whose incorporation has been mentioned, is making plans for building a plant that will have a manufacturing floor space of approximately 30,000 sq. ft.

The Wardlaw-Thomas Paper Company, Middletown, Ohio, is making an addition to its plant, 40 x 200 ft., two stories, of brick construction. Only a small amount of additional equipment is to be purchased.

Work is progressing rapidly on the new plant of the Domestic Engineering Company, Dayton, Ohio, and at least two of the buildings will be ready for the necessary machinery equipment within the next 60 days.

Official confirmation has not been obtained of the report that the Recording & Computing Machines Company, Dayton, Ohio, had received another very large order for time fuses from the Russian Government. Present activities of the company indicate that the rumor is correct and that additional equipment will be bought at an early date.

The Standard Trimmer Company, Springfield, Ohio, recently sustained a fire loss in its machine shop and store-room estimated at \$10,000. Rebuilding operations are already under way.

The Favorite Stove & Range Company, Piqua, Ohio, will construct an enameling plant estimated to cost \$25,000.

The Wood Shovel & Tool Company, Piqua, Ohio, is having plans prepared for an extensive addition to its plant.

The W. E. Lamneck Company, Columbus, Ohio, sheet-metal worker and maker of gas heaters, is having plans pre-

pared for a new factory that will more than double its present capacity.

The Linde Air Products Company, Forty-second Street Building, New York, has purchased property at Stanton and Melish avenues, Cincinnati, Ohio, and will erect a plant.

The Beckley & Myers Ice & Fuel Company, Springfield, Ohio, will erect a large ice plant on Linden Avenue. Contract for the building and most of the equipment has already been given out.

The Central South

LOUISVILLE, KY., Jan. 22, 1917.

Recurrence of an acute car shortage, further intensified by a heavy snow which has slowed up the movement of coal, together with reduction of the supply of natural gas, has been making difficulties for the manufacturing concerns in this section. Inquiries continue numerous, however, in the majority of lines, and the leading plants have been able to continue operations on full-time basis. Smaller industrial companies have had to suspend. Automobile garage equipment continues to be in very brisk demand and there are a number of inquiries for used steam power equipment. Pumps and air compressors are having a generous call.

Reports are current in Louisville that the Interstate Public Service Company, Indianapolis, is contemplating the construction of a hydroelectric power plant on Blue River, at White Cloud, Ind., west of Louisville.

The Bridgeford Mfg. Company, Louisville, Ky., has been incorporated, with capital stock of \$184,000, to do a foundry and stove manufacturing business. P. C. Doerhoefer, George Leff and J. W. Campbell are the incorporators.

The D. & E. Mining Company, Louisville, Ky., will install in its mine at Webb City, Mo., an air compressor of 2500 cu. ft. per min. capacity, with a Corliss valve steam compound, air bubble stop, to operate at 130 lb. steam pressure and deliver air at 110 lb., and a Corliss engine, 18 x 36. Second-hand equipment will be considered.

W. W. Gibson & Son, Mayking, Ky., are in the market for a second-hand 15-hp. engine and boiler.

The Jackson Water Works Company, Jackson, Ky., contemplates improvements to its plant to cost \$50,000.

A company will be incorporated at Paducah, Ky., to take over and rehabilitate the two ice plants formerly owned by the Paducah Ice Company. They were purchased for about \$55,000 by J. Denis Mocquot, acting for a group of capitalists.

A trustee's sale of the machine shop and foundry of the Stewart-Bruckner Company, Nashville, Tenn., has been announced for Feb. 1, the amount to be raised being \$25,000, represented by bonds. Efforts are being made to reorganize.

Construction of the plant of the DeCamp-Glass Casket Company, at Kingston, Tenn., will begin within a few weeks, according to J. D. Witherington, Memphis, Tenn., president of the company, which is capitalized at \$1,000,000.

J. H. Core, James Graham, George H. Armistead, Jr., Nashville, Tenn., and others, are organizing a company which proposes to establish a plant and manufacture a new type of automobile speedometer. The capital stock will be \$100,000.

The F. W. Crow Stave & Lumber Company, Dickson, Tenn., has been incorporated with capital stock of \$10,000 by F. H. Crow, Pitt Senslee, and others.

The American Lumber & Mfg. Company, Johnson City, Tenn., recently incorporated with capital of \$25,000, will build a mill building 60 x 260 ft., and will install saw and planing-mill machinery for lumber and dimension stock.

John W. Cate, Cleveland, Tenn., and others, will organize a company and construct a cotton gin at Cleveland with a daily capacity of 30 bales.

F. Williamson, Johnson City, Tenn., is asking for prices and information on equipment for a furniture factory, to include stationary steam engine and boilers, 50 and 100-hp. and smaller motors, three-phase, and hangers, transmission equipment, etc.

Birmingham

BIRMINGHAM, ALA., Jan. 22, 1917.

A spirited increase in the demand for woodworking machinery featured the past week. Gasoline engines were heavy sellers. Machine tools are very active, delivery being the only problem. Business is good all around.

The Birmingham Stove & Range Company, Birmingham, has increased its capital stock from \$55,000 to \$122,000.

St. Louis

ST. LOUIS, MO., Jan. 22, 1917.

The machine-tool trade continues at a high level in volume of business, with constant new demand. The steadiness with which the call for equipment keeps up is regarded as remarkable in the light of deferred deliveries and the lack of assurance of any material improvement. As has been the case for a long time no lists of any consequence are put out, the purchases being made privately and in single tool orders.

The Medart Patent Pulley Company, St. Louis, has purchased a site for a new plant which will be built as soon as plans are prepared.

The Mauthe-Schaefer Mfg. Company, St. Louis, has been incorporated with a capital stock of \$12,000 by William J. Mauthe and Henry B. Irwin of De Soto, Mo., and Louis Schaefer, St. Louis, to do a general machinery manufacturing business.

The Parish Motor Company, Sikeston, Mo., has been incorporated with a capital stock of \$17,000 by L. J. Parish, John Fox and L. J. Ables, and will install machine shop equipment.

The Ford Brass Company, Springfield, Mo., has been incorporated with a capital stock of \$10,000 by H. T. and T. M. Ford and J. A. Gammon.

The Cal Hirsch & Sons Mercantile Company, St. Louis, is in the market for a 5 to 15-ton locomotive crane equipped with two or eight wheels, with or without magnet.

The St. Louis Screw Company, St. Louis, wants boat spike machines.

The Corinth Machinery Company, Corinth, Miss., will purchase one 7½ or 10-ton second-hand chain hoist in good condition.

The Caruthersville Plumbing & Automobile Company, Caruthersville, Mo., has been incorporated with a capital stock of \$16,000 by N. M. Helm, John F. Ray and E. S. Berry and will install machine shop equipment.

Edgar Masoner of Bentonville, Ark., and W. A. Wilson of Springdale, Ark., will equip an electric light and power plant and a waterworks plant at Rogers, Ark., to cost about \$100,000.

The Alfrey Heading Company, Little Rock, Ark., has been incorporated with a capital stock of \$75,000 by W. F. Alfrey, W. L. Priest, and others, and will equip a plant, requiring much wood-working machinery.

The Oklahoma Light & Power Company, Ada, Okla., controlled by Mainland Brothers, Chicago, Ill., will equip a hydroelectric plant to cost about \$3,000,000 near Ada.

The American Glass Casket Company, Ada, Okla., has increased its capital from \$150,000 to \$500,000 and has acquired the Mound Valley Glass Company of Kansas. It will require new equipment in its improvement plans.

The Anderson Automobile Company, Muskogee, Okla., has been incorporated with a capital stock of \$15,000 by A. T. Woods, A. B. Madden, and others, and will equip a machine shop.

D. D. Daggett, Jennings, La., will equip a two-story brick building, 61 x 142 ft. for a machine shop and garage.

The Roberts-Wiegand Pickle Company, New Orleans, La., has been incorporated with a capital stock of \$100,000 by P. H. Roberts, Metropolitan Bank Building, and others, and will install one 100-hp. boiler engine, electric motors, sanitary pumps, vinegar pumps, and other mechanical equipment.

The Southwestern Gas & Electric Company, Shreveport, La., will increase the equipment of its plant at an expenditure of about \$100,000.

The William C. Johnson & Sons Machinery Company, St. Louis, has completed arrangements for the construction of a two-story building, 67 x 127 ft., to be completed about April 1.

The Globe Motor Truck Company, formed by J. H. Eddy and F. N. Woodard, Detroit, Mich., has taken over the plant of the National Iron Works, at East St. Louis, Ill., which will be remodeled and re-equipped. The men to have charge of the operations of the plant will be drawn from the company's present plant at Northville, Mich. St. Louis directors are John F. Hines, Christopher Beckermeyer, Jr., William H. Corcoran, Louis Fusz, David A. Marks, William C. Miehler and George E. Raithel.

The Granite City Steel Works, Second and Destrehan streets, St. Louis, a subsidiary of the National Enameling & Stamping Company, Granite City, Ill., is re-equipping its plant, including the installation of electric power, at a cost of about \$100,000. Foreign orders, from Japan and elsewhere, are given as the reason for the increased activity.

San Francisco

SAN FRANCISCO, CAL., Jan. 16, 1917.

The last advance in machine-tool prices is hampering business to a considerable extent, many prospective buyers who were ready to place their orders having decided to hold off. Merchants having tools on hand, however, are doing a very good volume of business and in addition to local needs, there is an active foreign demand. Occasional resales out of stock to Eastern buyers are reported. Local buying has dropped back to a single-tool basis, with most inquiries from shops of small size. Activity in miscellaneous lines shows little abatement. Hydroelectric and reclamation projects are furnishing an exceptional volume of business. While mining operations in many districts are interrupted at this season, buying of mine hoists, compressors, ore mills, etc., continues active, and the movement of oil well equipment is the best in several years. Inquiries for mill and logging machinery are coming out more freely, though orders are still a little slow in closing.

The Western Pipe & Steel Company has placed its plant at Richmond, Cal., on an eight-hour basis.

The Yuba Construction Company, Marysville, Cal., specializing on gold dredges, tractors, etc., has taken over the old Benicia Iron Works implement plant at Benicia, Cal., formerly owned by Baker & Hamilton. The plant includes 12 buildings with water frontage, covering several acres. It is understood that the plant will be used for making the company's tractors, implements, pumps, etc. A few new tools have been ordered. The Yuba Company has orders for a 1000-ton gold dredge for Alaska and 800-ton dredges for use in Colorado and Idaho.

The Llewellyn Iron Works, Los Angeles, is rebuilding its shop recently burned. So far few new tools have been ordered, and it is believed most of the old tools can be repaired.

The Main Street Iron Works, San Francisco, has orders for several large marine engines for hulls now being built at northern points.

Stephenson & Nicholls have been appointed agents in northern and central California for the Terry Steam Turbine Company, Hartford, Conn.

A garage and machine shop is included in plans of the Desmond Park Service Company for improvements in Yosemite Valley.

The Santa Fe Railroad is taking figures on the construction of a 40-stall roundhouse and a number of shop buildings at Needles, Cal.

The Senn Concentrator Company, manufacturer of mining machinery, and the H. C. Macondry Foundry Company, both of Berkeley, Cal., have purchased a number of lots adjoining their respective properties, in preparation for plant additions.

The California Talc Company, Keeler, Cal., is building a talc-grinding plant of 20 tons daily capacity.

The Pacific Northwest

SEATTLE, WASH., Jan. 16, 1917.

A number of the shipyards in the Northwest have been forced to decrease their force, on account of shortage of materials from the East. The lumber industry shows conditions practically unchanged, with production heavily curtailed and the car supply still far short of requirements, though showing improvement. Orders are in fair volume. It is evident that the cargo lumber business is gradually coming back to its position before the European war drained the Pacific of lumber-carrying tonnage. The embargo recently placed by the British Government on silver spruce, used for aeroplane stock, in order to control spruce importations in the United Kingdom, will, according to leading lumbermen, have a serious effect on the general business conditions of the Pacific Northwest, particularly on the lumber industry. While the embargo mentions silver spruce, it is the general belief that the famous Sitka spruce, which has been in such great demand the past year, is meant.

The Matthews Shipbuilding Company, Hoquiam, Wash., will construct a steam schooner with a capacity of 1,500,000 ft. for the Hart-Wood Lumber Company of San Francisco and Raymond, Wash. It will be equipped with 800-hp. triple expansion engines.

The Western Boat Building Company, Tacoma, Wash., has been incorporated for \$25,000, with M. A. Petrich as manager. It will immediately construct a shipbuilding plant to build boats up to 65 ft. in length. Contracts for four boats are in hand, representing an expenditure of \$40,000.

The plant of the Central Door & Lumber Company,

Portland, Ore., was damaged by fire recently with a loss of practically \$18,000 to the machinery. Repairs will be made at once, and new equipment purchased. A. F. Biles is president.

The Oregon City Foundry, Oregon City, Ore., has been incorporated, with a capital stock of \$20,000, by John A. Chester H. and Leslie V. Roake. It will establish selling agencies outside the city.

The Oregon-California Box Company, Klamath Falls, Ore., has been incorporated with \$40,000 capital, and has taken over the Savage Brothers' plant, with a capacity of 40,000 boxes per day, and will place it in operation. A. J. Voye, formerly of the Klamath Mfg. Company, M. S. West and Burge W. Mason are the Oregon people interested, and the Dwight Lumber Company of San Francisco represents the outside capitalists.

Dawson Brothers, Joseph, Ore., plan the construction of a sawmill to cost about \$20,000, which will have capacity of 40,000 ft. per day.

The McEachern Shipbuilding Company, Astoria, Ore., owned by McEachern Bros., has been purchased by A. O. Andersen & Co. It is understood the plant will be enlarged.

Armour & Co.'s packing plant in Spokane will be enlarged in the early spring by the construction of an addition to cost \$250,000. C. F. Hafer is manager.

The Beaver State Motor Car Company, Gresham, Ore., which is establishing a malleable-iron foundry, will have it completed in about 60 days. P. A. Coombs is manager.

The American Can Company, Portland, Ore., plans an addition to its plant in Portland. Detailed plans have not been announced.

The A. J. Jordan Lumber Company's plant at Columbia Falls, Mont., was destroyed by fire recently, with a loss of \$30,000. The plant will be rebuilt at once.

Otis & Co., Miles City, Mont., has been incorporated with a capital stock of \$100,000, by G. S. Otis, F. J. Jelinek, W. W. Andrus, G. E. Brown, B. G. Bergerson, to establish a meat-packing plant.

The Utah-Idaho Sugar Company, North Yakima, Wash., which is erecting a sugar mill at a cost of \$1,250,000, plans to build a pulp drier to cost \$105,000.

Olympia, Wash., has granted a 25-year franchise to the American District Steam Company, North Tonawanda, N. Y., to operate a central steam heating and electric plant.

The Kamiah Asbestos Company, Spokane, Wash., has increased its capital from \$10,000 to \$25,000, and will make additions.

Canada

TORONTO, ONT., Jan. 22, 1917.

A munitions plant for the Imperial Munitions Board of Ottawa, to cost \$3,000,000, is to be located on the new industrial site in Ashbridges Bay, Toronto, and construction work will commence without delay. It will occupy 60 acres and will be equipped to produce electric steel and forgings. An initial capacity of 300 tons a day is planned. It is announced that 10 6-ton, three-phase, 25-cycle Heroult electric furnaces will be installed. The plant will require from 800 to 1000 men to operate it.

The Canadian Chicago Bridge & Iron Company, Ltd., Bridgeburg, Ont., will build an addition, 60 x 70 ft., to its main plant. C. C. Gregory is manager.

The Dominion Iron & Steel Company, Ltd., Sydney, N. S., proposes to purchase a 2000-kw., electrical unit complete and water-tube boilers of 3000 hp., for its mines at Wabana, Newfoundland. Other equipment will be purchased totaling about \$1,000,000.

The Dominion Coal Company, Glace Bay, N. S., is in the market for a 1500-hp. turbine plant complete. A. J. Tonge is general superintendent.

Beatty Brothers, Ltd., Fergus, Ont., is in the market for a 6 to 10-ton cupola, cupola blower, exhaust fan, tumbling mills, boiler, steam pumps, scales, motors, steam engines, etc.

Canada Beds, Ltd., Chesley, Ont., is in the market for three new or second-hand engine lathes, 5 or 8-ft. bed, 2 1/4-in. belt drive, with 8 to 10-in. swing. Also one 5 to 8-ft. engine lathe, 3-in. belt drive, with 8 to 10-in. swing.

The Pacific Mills, Ltd., Ocean Falls, B. C., is erecting a pulp and paper mill of 100 tons a day capacity, to be ready for operation by April. It is owned by the Crown Willamette Paper Company, Portland, Ore.

Tenders for the installation of a 40,000,000-gal. centrifugal pump for the waterworks plant at Toronto have been extended until Jan. 30. T. McQueen, City Hall, is secretary.

Incorrect reports have been published to the effect that the Pratt Engineering Company, New York City, has commenced the erection of a plant at Trenton, Ont., for the Imperial Munitions Board of Canada, Ottawa, for the manufacture of fuses, munitions, etc. The facts are that the Pratt Engineering & Machine Company of Atlanta, Ga., are building for the Board plants for the manufacture of acids. The Pratt Company is a manufacturer of such equipment and maintains an office at 61 Broadway, New York.

The Metal Craft Company, Ltd., Grimsby, Ont., will erect a factory at a cost of \$5,000 and will install \$3,000 worth of machinery for making pressed steel goods, etc.

The Canadian Cycle & Motor Company, Ltd., Weston Road and Dufferin Street, Toronto, will erect a new plant at Weston, Ont.

The Ker & Goodwin Machine Company, Ltd., Brantford, Ont., has increased its capital stock from \$50,000 to \$100,000.

The Canadian Westinghouse Company, Ltd., Hamilton, Ont., has increased its capital stock from \$5,000,000 to \$10,000,000.

The Industrial Chemicals, Ltd., Montreal, has been incorporated with a capital stock of \$2,750,000 by Gordon W. MacDougall, Lawrence Macfarlane and others, to manufacture dyestuffs, chemicals, etc.

The Universal Machinery Company, Ltd., Montreal, has been incorporated with a capital stock of \$200,000 by Herbert Johnson, Charles R. Jones, Frank T. Malone, and others, to manufacture wood-working machinery, etc.

Masters & Co., Ltd., Montreal, has been incorporated with a capital stock of \$200,000 by Arthur R. Holden, Pierre A. Badeaux, Ernest G. Bennett, and others, to manufacture munitions, etc.

The Lake Winnipeg Paper Company, Ltd., Ottawa, has been incorporated with a capital stock of \$5,000,000 by Duncan B. McDonnell, Winnipeg, Edward Seybold, Angus W. Fraser, and others, of Ottawa.

Samuel Osborn of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Albert E. Myles, Francis J. Lavery, John W. Blair, and others, to manufacture steel, metals, machinery, etc.

Robert Maw & Co., Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Thomas B. Gould, and others, to manufacture iron and wood-working tools, etc.

The Water Purification, Ltd., Ottawa, has been incorporated with a capital stock of \$40,000 by Edward M. Knight, James T. Mitchell, William A. Wyman, and others, to manufacture water filters, etc.

The Collingwood Shipbuilding Company, Ltd., Collingwood, Ont., has been incorporated with a capital stock of \$2,600,000 by Reginald H. Parmenter, 93 Dunvegan Road; Arthur J. Thomson, 85 Bay Street, and others.

The Ajax Rubber Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of \$1,000,000 by William D. Hamilton, Richard S. Gilpin, George W. Miller, and others.

Government Purchases

WASHINGTON, D. C., Jan. 22, 1917.

The following bids were received on Dec. 15 by the commanding officer, Rock Island Arsenal, Ill., for furnishing machine tools:

Circular 682

One 24-in. double back-geared engine lathe—Bid 93, Boye & Emmes \$2,080; 48, Whitcomb-Blaisdell \$1,998; 129, Hamilton type \$1,945; 61, Walcott type \$2,190; 84, Lodge & Shipley \$2,650; 40, American Tool Works 12-ft. medium pattern \$1,769, for each additional 2 ft. \$68, American Tool Works 14-ft. heavy pattern \$2,286, each additional 2 ft. \$80; 101, 26-in. x 8-ft. gear drive \$2,360, 26-in. x 15 ft. belt drive \$2,177; 106, 26-in. Pittsburgh type \$2,100.

Circular 667

One belt-driven spur-geared planing machine—Bid 129, Rockford pattern \$7,260; 61, \$8,008, with 50-in. table \$8,148, with 56-in. table \$8,288, with 62-in. table \$8,428; 84, Cincinnati type \$8,700; 101, Pond type \$6,470, or complete with four-belt drive \$6,986; 48, Detrick & Harvey standard \$10,200.

Circular 675

One 24-in. double back-geared engine lathe—Bid 48, Whitcomb-Blaisdell \$1,998; 61, Walcott lathe \$2,190; 129, Hamilton type \$1,945; 93, Boye & Emmes \$2,080; 101, 25-in. Pond gear drive \$2,360, 26-in. Pond belt drive \$2,177; 84, Lodge & Shipley \$2,650; 40, American Tool Works 12-ft. medium pattern \$1,769, for each additional 2 ft. \$68, American Tool Works 14-ft. heavy pattern \$2,286, for each additional 2 ft. \$80; 106, 26-in. Pittsburgh type \$2,100.

Circular 710

One plain high-power constant-speed belt-driven horizon-

tal milling machine—Bid 129, No. 2½ Rockford type \$1,480; 61, No. 2-B Kearney & Trecker type \$1,774; 84, No. 2 Cincinnati miller \$1,755; 20, No. 2-B Brown & Sharpe type \$1,785.

Circular 673

One 24-in. double back-geared instantaneous-change gear engine lathe—Bid 93, Boye & Emmes type \$2,080; 129, Hamilton type \$1,945; 48, Whitcomb-Blaisdell lathe \$1,998; 101, 25-in. Pond gear drive \$2,360, 26-in. Pond belt drive \$2,177; 61, Walcott lathe \$2,190; 84, Lodge & Shipley type \$2,650; 40, American Tool Works 12-ft. type \$1,769, for each additional 2 ft. \$68, 14-ft. type \$2,286, for each additional 2 ft. \$80; 106, 26-in. Pittsburgh type \$2,100.

Circular 704

One vertical milling machine—Bid 101, Bement No. 10, belt-driven \$3,265.

Circular 671

One two-spindle gun drill—Bid 111, \$6,090.

Circular 711

One high-power constant-speed belt-driven horizontal milling machine—Bid 129, Rockford No. 2½ \$1,480; 61, No. 2-B Kearney & Trecker \$1,774; 84, No. 2 Cincinnati \$1,755; 20, No. 2-B Brown & Sharpe \$1,785.

Circular 660

One elastic rotary-blow riveting machine—Bid 127, \$205; 105, 3/16-in. pattern \$145; ¾-in. pattern \$215; 40, \$200; 129, \$210.

Circular 658

One back-geared double-crank press—Bid 10, \$3,260; 121, \$2,050; 130, \$2,300; 1, \$2,660; 84, \$2,837.

Circular 652

One No. 2 universal spring-coiling machine—Bid 128, for machine with demonstrator, at Worcester, Mass., \$1,166; at point of delivery, \$1,266.

Circular 651

One Eveland portable electric riveter—Bid 41, \$560.

Circular 692

One Bullard 36-in. vertical turret lathe—Bid 52, A \$2,145, B \$2,295; 84, \$5,375; 101, Niles with 3-jaw chuck \$4,245, Niles with 4-jaw chuck \$4,210.

Circular 685

One full universal heavy-duty radial drill with 5-ft. arm—Bid 129, for Fostick type with plain table \$2,445, with universal table \$2,621; 93, for Dreses Machine Tool type with plain table \$2,670, with universal table \$2,790; 40, American Tool Works type with plain table \$2,663, with universal table \$2,718; 84, Cincinnati Tool type with box table and cooling equipment \$2,745, with universal table \$2,870; 101, Niles type \$1,565, with universal table \$1,690.

Circular 686

One full-universal heavy-duty radial drill with 6-ft. arm—Bid 93, Dreses Machine Tool type with plain table \$3,160, with universal table \$3,305; 129, Fostick type \$3,017 and \$3,193; 40, American Tool Works pattern \$3,168 and \$3,238; 129, Cincinnati Tool type \$3,245 and \$3,395; 101, Niles type \$2,115, with universal tilting and rotating table \$2,240.

Circular 690

One 42-in. Bullard vertical turret lathe—Bid 52, A \$3,800 and B \$4,000; 84, \$5,900; 101, \$4,210.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Jan. 16, for supplies for the naval service as follows:

Schedule 529, Steam Engineering

Class 11, Mare Island—One engine lathe—Bid 64, \$1,165; 71, \$973 and \$1,388; 93, \$1,257, \$1,321 and \$1,322; 113, \$1,961; 138, \$950; 157, \$1,936.

Class 12, Mare Island—One double emery grinder—Bid 25, \$255; 26, \$199; 34, \$225; 64, \$251; 93, \$245; 105, \$189; 138, \$235.

Class 13, Mare Island—One universal bench drill—Bid 71, \$115; 105, \$106; 138, \$125.

Schedule 542, Ordnance

Class 31, Fort Mifflin—One back-geared lathe—Bid 93, \$4,245; 93, \$4,097, \$3,945, \$4,035, \$4,022; 101, \$4,035; 105, \$4,150 and \$4,100; 136, \$4,375; 152, \$4,389; 176, \$4,065.

Schedule 548, Steam Engineering

Class 55, Brooklyn—One motor-driven lathe—Bid 93, \$5,532; 101, \$5,095; 105, \$3,655; 116, \$4,060.

Class 56, Brooklyn—One engine lathe—Bid 27, \$1,692.70; 46, \$2,560; 93, \$1,950, \$1,976 and \$1,986; 101, \$2,580; 116, \$2,315; 152, \$2,398; 156, \$1,196; 172, \$2,654.

Class 57, Brooklyn—One engine lathe—Bid 93, \$2,300, \$2,321 and \$2,323; 101, \$2,250; 116, \$2,298; 152, \$2,279; 156, \$1,417.95; 172, \$2,544.

Class 58, Brooklyn—One motor-driven column shaper—Bid 93, \$1,391 and \$1,427; 101, \$1,367; 105, \$1,155; 116, \$1,505; 152, \$1,406.

Class 59, Brooklyn—One radial drill—Bid 46, \$1,648; 93, \$1,767, \$1,790 and \$1,840; 101, \$1,366; 105, \$1,600; 116, \$1,695; 152, \$1,900.

Class 60, Brooklyn—One universal motor-driven milling machine—Bid 20, \$2,970.30 and \$1,778.50; 61, \$3,050.

Class 61, Brooklyn—One motor-driven emery grinder—Bid 26, \$236.90; 34, \$297; 93, \$233.50; 105, \$270.

Class 62, Brooklyn—One motor-driven hacksaw—Bid 105, \$135, \$136 and \$245; 119, \$194.40; 160, \$225.

Class 63, Brooklyn—One motor-driven sensitive drill—Bid 82, \$284; 101, \$445; 105, \$170.

Class 64, Brooklyn—One band saw—Bid 7, \$392; 25, \$571.65; 27, \$448; 65, \$486, f.o.b. St. Louis; 93, \$413, \$395 and \$502; 105, \$445 and \$388; 108, \$398; 151, \$440.

Class 65, Brooklyn—One pattern makers' lathe—Bid 7, \$649.50; 108, \$588.

Class 66, Brooklyn—One oil-burning crucible furnace—Bid 85, \$325; 91, \$375.

Class 67, Brooklyn—One motor-driven positive pressure blower—Bid 25, \$360.65; 126, \$210 and \$310.

Schedule 549, Steam Engineering

Class 68, Philadelphia—Three motor-driven lathes—Bid 7, \$212; 45, \$207 and \$308; 71, \$180; 108, \$148.

Schedule 550, Steam Engineering

Class 69, Brooklyn—Two turret lathes. No bids.

Schedule 567, Steam Engineering

Class 111, Brooklyn—Three precision lathes—Bid 71, \$975; 116, \$790.

Class 112, no bids.

Schedule 568, Steam Engineering

Class 113, Brooklyn—One water-tube boiler with spare parts—Bid 4, \$6,740; 123, \$8,000; 134, \$5,860; 146, \$7,594; 164, \$7,096.

The names of the bidders and the numbers under which they are designated in the above lists are as follows:

Bid 1, American Can Company; 4, Almy Water Tube Boiler Company; 7, American Wood Working Machinery Company; 10, E. W. Bliss Company; 20, Brown & Sharpe Mfg. Company; 25, W. Irwin Cheyney; 26, Cincinnati Electrical Tool Company; 27, Carroll Electric Company; 34, Jas. Clarke Electric Company; 40, E. L. Essley Machinery Company; 41, Eveland Electric Riveter Company; 45, J. A. Fay & Egan Company; 46, Fairbanks Company; 48, Federal Machinery Sales Company; 52, Gisholt Machine Company; 51, Hill, Clarke & Co., Inc.; 64, Harron, Rickard & McCone; 65, Hall & Brown Woodworking Machine Company; 71, Kemp Machinery Company; 82, Leland-Gifford Company; 83, L. R. Weisenhelter Machinery Company; 84, Marshall & Huschart Machinery Company; 85, Monarch Engineering Company; 91, Mires Fuel Oil Equipment Company; 93, Manning, Maxwell & Moore, Inc.; 101, Niles-Bement-Pond Company; 105, D. Nast Machinery Company; 106, Neidow & Payson Company; 108, Oliver Machinery Company; 111, Pratt & Whitney Company; 113, Pacific Tool & Supply Company; 116, Henry Prettiss & Co., Inc.; 119, Racine Tool & Machine Company; 121, Rockford Iron Works; 123, Roberts Safety Water Tube Boiler Company; 126, P. H. & F. M. Roots Company; 127, F. B. Shuster Company; 128, Sleeper & Hartley Company; 129, H. A. Stocker Machinery Company; 130, D. H. Stoll Company; 134, Gas Engine & Power Company and Chas. L. Seabury & Co.; 136, W. E. Shipley Machine Company; 138, T. O. Stallman Supply Company; 146, Talbot Boiler Company; 152, Vandyck-Churchill Company; 156, Ward & Co.; 157, Fred Ward & Son; 160, Wisconsin Electric Company; 164, Charles Ward Engineering Company; 172, Hendey Machine Company; 176, Swind Machinery Company.

Pennsylvania Industrial Casualties in 1916

Reports received by the Pennsylvania Department of Labor and Industry show that 2957 employees were killed in industrial accidents throughout that State in 1916. The mines were responsible for most of the deaths, being credited with 1057, while 1204 occurred in the general industries and 336 in the employ of public service corporations. No figures have yet been obtained to show what percentage of those killed in the general industries met death while at work in steel and iron mills, but these totals are to be announced soon. It is intimated at the department that this percentage will be high.

Allegheny County leads in the 1916 death toll with the record of 356 workers killed during the year in industrial work. Of these victims 27 were employed by public service corporations, 43 in mines and 286 in general industries.

A general safety code is being prepared in Ohio, which is expected to be ready for adoption in about six months. This code is being prepared by a committee on general safety standards appointed by the Industrial Commission of Ohio.

NEW TRADE PUBLICATIONS

Concrete Construction.—Cement-Gun Construction Company, 900 South Michigan Avenue, Chicago, Ill. Bulletin No. 5. Illustrates the application of the cement-gun process to the protection of structural steel, the construction of walls and buildings, etc. The process employs a dry mixture of cement and sand of various grades and proportions which is blown or shot by air pressure through a hose line to the place of deposit, the necessary water for the hydration of the mixture being added at the instant the material passes through the mixing nozzle. The advantages claimed for this method are perfect mixture and hydration and the securing of a concrete in which all superfluous moisture and air are expelled and a strong bond secured with the material to which it is applied. A number of views of the applications of the process are presented, and in some cases are supplemented by brief descriptions of what was done.

Roof Vent and Leader Connections.—Barrett Company, 17 Battery Place, New York City. Booklet. Describes and illustrates a line of vent and leader connections for use on roofs of all kinds. In addition to an illustration of the connection, a section showing the method of installation is given. Brief descriptions and size tables of the various types of connections are included.

Calendar.—Youngstown Sheet & Tube Company, Youngstown, Ohio. Each page contains one or more illustrations of different parts of the company's plants. A large amount of statistical information regarding the various lines of products is included.

Wood Paving Blocks.—Barber Asphalt Paving Company, Philadelphia, Pa. Pamphlet. Refers to the use of wood blocks for floors and pavements in factories, warehouses, piers, garages, bridges and streets with reasons for their use. The advantages of durability and freedom from bleeding are touched upon. A suggested specification is presented, together with views of installations and a partial list of users.

Slide Rule.—George W. Richardson, 4214 West Twenty-fourth Place, Chicago, Ill. Circular. Calls attention to a merchant's slide rule designed especially for computing commercial problems. An illustration of the rule, which is made of monel metal and can be carried in the pocket easily, is given and a number of examples showing the variety of commercial calculations that can be made are included.

Iron and Steel.—Dunham, Carrigan & Hayden Company, San Francisco, Cal. Brochure entitled "Fierro en Paz" (Iron in Peace). Illustrates and describes the growth of the company's business since its foundation in 1849, with brief references to the history of California and San Francisco. A number of interesting illustrations of the city and of the various structures occupied by the company serve to supplement the text and illustrate the progress that has been made both in business and in transportation facilities in the past 67 years.

Ball Bearing Hangers and Pillow Blocks.—S. K. F. Ball Bearing Company, Hartford, Conn. Bulletin No. 75. Refers to the use of ball bearing hangers and pillow blocks. The questions of power saving, use of smaller motors, saving in lubricating and friction and reduced fire hazard are discussed, the text being supplemented by a number of engravings of installations as well as of the hangers themselves. A description of the bearings is presented and information is given on their mounting and lubrication, the testing of lubricants and the installation of felt seals. Dimension tables and diagrams of the hangers and pillow blocks are included.

Blow-Off Valves.—Homestead Valve Mfg. Company, Homestead, Pa. Folder. Devoted to a combination of a quarter-turn plug cock and an angle blow-off valve, which was illustrated in THE IRON AGE, Oct. 21, 1915. The advantages claimed for this arrangement are a double protection against leakage and the possibility of closing the valve nearer the boiler and thus enabling the blow-off valve to be repaired without shutting down the boiler.

Water Tube Boilers.—George T. Ladd Company, 1629 Farmers Bank Building, Pittsburgh, Pa. Catalog No. 17. This is the company's 1917 catalog describing and illustrating a line of boilers which are an improvement over the Milne type, the patents for which were acquired by this company some time ago. After presenting a number of facts about the boiler, the three types built, the Dutch oven, high arch and multi-drum are briefly described with references to the pages on which illustrations are presented. The details of construction and operation are gone into at some length, the text being supplemented by a number of views of installations and sectional drawings.

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